INTEGRATED RENEWABLE RESOURCE MANAGEMENT FOR U.S. INSULAR AREAS

Volume II: Commissioned Papers

Part F: Development Planning Considerations

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Background Paper No. 1

AN OVERVIEW OF SELECTED NATURAL SYSTEMS PLANNING AND MANAGEMENT TECHNIQUES FOR U.S.-AFFILIATED ISLANDS

by

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ABSTRACT

Sustainable resource development in U.S-affiliated islands requires careful natural systems management practices. Current management practices could be improved with more systematic resource assessment. However, there is no single natural systems analytic technique that, if adopted, would dramatically improve the quality of management. Rather the choice among analytic techniques should be based on their consistency with existing resource management approaches and mechanisms.

Natural systems management in U.S.-affiliated islands is characterized by four basic approaches: activity management; area management; sectoral management and integrated management. Specific management techniques include permit systems for specific resource use activities, zoning, the designation of special areas for intensive management and other techniques.

Several types of analytic techniques are described and briefly assessed: environmental impact statements and post-project assessment; ecological baseline surveys and ecological monitoring; land suitability analysis; and carrying capacity.

Given the current management emphasis on the regulation of impact generating activities, environmental impact assessments are likely to remain, in the short run, a primary technique for natural systems assessment. However, in view of the static and incomplete picture of natural systems provided by EIS, other techniques should be examined for possible adaptation to island conditions in U.S.-affiliated islands. In particular, the possible development of ecological baseline surveys should be examined as a basic source of natural systems management information.

Integrating new analytic techniques into existing natural systems management structures in U.S.-affiliated islands will require special attention to implementation issues. What is needed is an adaptive, experimental approach which allows for testing and refining techniques in different contexts to deal with different natural systems management problems. This adaptive approach should include assessments of the existing capabilities for resource assessments in island environments, workshops to set priorities for future approaches to data gathering and analysis, training and demonstration and greater coordination among federal agencies with jurisdiction in U.S. affiliated islands. This adaptive approach should allow for formulation of proposals for natural systems data gathering and assessment, field testing and refinement of assessment techniques and broad dissemination of ideas about assessment techniques appropriate for island environments.

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I. INTRODUCTION

The need for basic information and the appropriate technologies for analyzing that information are a fundamental requirement for successful resource management. As Carpenter, *et al* note:

> Successful sustainable economic development requires effective assessment of the opportunities for, and constraints on, using renewable natural resources, while at the same time maintaining environmental quality. The lack of an adequate data base is a frequent and significant barrier to complete and timely assessments that are required to assist policy and decision makers (Carpenter, *et al*, 1985).

While there is broad agreement about the need for resource information and analysis, there is much less agreement about what types of information should be collected and stored, what types of analysis are most appropriate and how information collection and analysis should be integrated into resource management programs. There are no simple answers to these questions. Indeed, even tentative, general answers depend on the nature of the resource management problems confronted by a country, the degree of geographic specificity in planning and management efforts to deal with these issues and the particular management techniques that are being employed for problem mitigation. Each of these themes is discussed below.

1.1 *Resource use problems*

Natural systems management problems are usually perceived in one of three ways: 1)as resource *uses*, such as dredging, that degrade or deplete resources; 2)as the *consequences* of particular resource uses, such as reef kills; or 3)as *conflicts* over particular resource uses, such as whether or not a particular coastal site should be a tourist development or acquired for public use. While all three perspectives have their uses, natural systems problems in this paper refers to specific consequences of resource uses which are perceived as adverse. While defining problems in terms of a range of consequences has the advantage of separating effects from problem causes, the primary advantage of such a perspective is that analysts can agree that certain conditions are undesirable without having to agree on what the causes of the conditions are, what mitigating measures should be employed or whether one set of "consequences" is more undesirable than another.

In U.S. affiliated islands such "consequences" include, but are not limited to, decreased fish yields, contamination and depletion of groundwater, depletion and degradation of agricultural lands, loss of attractiveness to tourists, and loss of species of flora and fauna. The causes of these problems vary from island to island. Decreased fish yields, for example, are caused by a variety of factors including over-fishing, increased turbidity and sedimentation from dredging and from watershed erosion, destruction of habitats by blasting, mining, filling and other causes, degradation of habitats by domestic and industrial sewage and a host of other causes.

1.2 Natural systems management

Natural systems management refers to "actual decisions concerning policy or practice regarding how resources are allocated and under what conditions or arrangements resources may be developed (Mitchell. 3).

Resource management includes both planning activities in which resource management objectives and techniques for achieving those objectives are identified and implementation activities in which specific management techniques such as permit systems, are used to allocate resources among uses (and users). Both planning and implementation require information and analysis in order to make optimal resource use decisions. Specific analytic techniques such as environmental impact statements have been developed to assist those who make resource use decisions.

This paper provides brief assessments of several of the most prominent techniques that are currently used to assist in natural systems management. The purpose of this assessment is to identify techniques that show particular promise in supporting natural systems management efforts in U.S. affiliated islands.

A central premise of this paper is that natural systems management activities dictate the choices of analytic techniques rather than vice versa. One of the central tasks of natural systems management is to generate the right questions about resources and resource uses. Some of these questions, such as how much water can be safely drawn from ground water supplies without increasing salinity or about what the impacts of a proposed dredge and fill operation will be on fish habitats require technical analysis. Appropriate techniques for gathering and analyzing information can help in answering these questions. The question of which techniques are best is thus a question of what questions need to be answered and which techniques can provide answers most effectively and efficiently. Determining what questions need to be answered requires an understanding of the existing natural system management context in which planning and implementation occur.

Planning. Resource management planning, as used here, refers to a systematic process employed to decide on a strategy for dealing with some resource use problem. Planning processes typically involve several steps:

a. The identification of some goal to be achieved (or problem to be mitigated):

b. The identification of alternative ways in which the goal can be achieved (or problem mitigated);

c. The evaluation of these alternatives:

d. The choice of a strategy and the specification how that strategy is to be implemented.

In the development of resource management programs there are three levels of planning: Policy, program and project. Policy planning refers to the broad choices that must be made among multiple and frequently competing resource management objectives. At this level the questions to be answered are explicitly value choices. For example, does the loss of prime agricultural land to non-agricultural uses represent a problem that requires governmental intervention even though such uses provide important forms of economic development? Does the rate and location of tourist facilities require direct governmental management? What roles should government take in the promotion and management of aquaculture and mariculture? In practice such policy choices are frequently expressed in terms of five year development plans, state policy plans or similar documents. Such policy statements provide some indication of a general awareness of resource management problems as well as the emphasis that such problems should receive. They are, however, no guarantee that such resource management problems will receive systematic management attention.

Program planning refers to the identification and evaluation of alternative ways to achieve some resource management objective. If loss of prime agricultural land to non-agricultural uses is regarded as a problem to addressed. What alternative management techniques might help mitigate the problem? A partial list of such techniques includes agricultural zoning, tax incentives to agricultural land owners to retain land in agriculture, direct subsidies to agricultural operators, outright purchase of development rights to agricultural lands, and performance standards for agricultural uses. All these management techniques have been or are currently being employed in a number of continental states.

The choice among resource management strategies is perhaps the most difficult task of program planning. Alternative management strategies must be evaluated, usually in terms of several criteria. The first and most obvious criterion is effectiveness. Will the proposed technique work in mitigating the resource management problem it is intended to address? More importantly, how effective is it relative to other techniques? Other criteria may include direct costs of administration, efficiency, ease of implementation and possible undesirable side effects. Careful program planners try to insure that they have included the relevant alternatives to be considered, that they have identified the most appropriate criteria for the evaluation of alternatives and that they have applied the criteria as rigorously as possible in their evaluation.

Project planning is sometimes used to describe the detailed specification of how a particular management strategy would be implemented or how a particular resource use would be undertaken. The first involves development of administrative guidelines and procedures for employing, say, an agricultural zoning program. How would such zones be established? What technical information would be required for establishing zones? How would owners be be notified of what zone they are in? How would applications for changes in zone boundaries be processed? These are among the many questions associated with project planning. The latter use of the term refers to the detailed specification of a particular resource use, such as an agricultural park, in ways intended to be consistent with resource management program objectives.

Policy, program and project planning all require information and analysis, although the nature of the information and analysis differs for each level of planning. Policy planning involves answering a mix of value and empirical questions. As planning becomes more specific there are fewer explicitly value issues and more empirical questions. The types of resource management analytic techniques that are most appropriate and useful become more obvious one examines the types of questions that need to be answered. Figure 1 provides a representative sample of the types of questions that need to be answered in planning a wetland management program.

Figure 1: Representative Information Needs in Planning
a Wetlands Management Program

Policy Planning

Why are wetlands important? Do they provide important habitats? Provide flood protection? Retain sediments and materials? Provide protection from erosion and storm surges?

Why should wetlands receive special attention at this time? Are they threatened? What is the nature and degree of the threats? How immediated are the threats?

How important is wetland management relative to other resource use problems? Among current and future users of wetlands who would be hurt and who would be helped by an intensive wetland management program? What is the distribution of potential benefits and burdens of a wetland management program?

What are the costs and benefits of doing nothing right now?

Program Planning

What specific uses or activities are contributing to wetland degradation or depletion? Are the causes related to sewage disposal? Sedimentation? Industrial pollution? Watershed changes resulting in alteration of nutrient or freshwater inputs? Conversion of wetlands to other uses?

Among the causes which require immediate attention? Which can be postponed?

Are there specific wetlands that should be singled out for special attention?

What are the current uses of wetlands by local communities and others?

What should management objectives be? To control all activities contributing to degradation/depletion? To focus on specific activities? To focus only on specific wetlands?

What resource management techniques will best meet these objectives? Are permit systems needed for controlling specific uses? Are more elaborate management techniques needed? Who would administer such programs?

How would effectiveness of each proposed management technique be measured? How difficult would it be to administer such a technique? How costly would it be? What other criteria are relevant to the evaluation of potential management techniques?

Project Planning

Given the choice of a particular management technique, how is it to be administered?

What guidelines and maps will have to be prepared? What do we need to learn bout wetland uses to prepage such maps and guidelines?

How will wetland conditions be monitored? What specific environmental parameters will be monitored? By whom? What developmental conditions will be monitored? By whom?

Implementation. Historically, the issues of who controlled the uses of island resources and the conditions under which resources could be used was governed by traditional law and practice. In Oceania, for example, the most widespread marine conservation measures were reef and lagoon tenure systems (Johannes, 350). Fishing rights were controlled by a family, chief or clan who thus regulated the exploitation of their own marine resources. Such marine resource techniques did not insure that resources were always used in ways that insured sustained yields or that there were no instances of waste and resource despoilation. To oversimplify, such resource management systems succeeded in insuring a rough balance between the demand and the availability of resources such as fish because, in the language of economists, the impacts of non-sustainable resource use practices were "internalized." That is to say, bad management meant less food for the group that exercised tenure over the reef or lagoon.

Traditional island resource management practices declined for a variety of reasons including the introduction of money economies, the breakdown of traditional authority and the imposition of new laws and practices by colonial powers (Johannes, 356). This process was a transformation rather than an evolution. The man/environment relationships upon which traditional practice were based were replaced by new concepts of ownership and more centralized approaches to management.

Although some traditional resource management practices still co-exist alongside contemporary programs, the resource management efforts described in this paper refer primarily to governmental programs (federal or local) to guide or direct the resource use practices of private actors and, in some important instances, other governmental agencies. This emphasis is not intended to minimize the importance of traditional methods or the resource management efforts of private actors, such as plantation owners. It is simply a convenience that allows us to focus on those resource management activities that currently dominate and are most susceptible to improvement through Congressional action or other initiatives.

The central fact of resource management in U.S affiliated islands is that there already exists a complex array of resources management programs. With the exception ofthe Trust Territories of the Pacific Islands (TTPI) where the pending Compact of Free Association will remove the Marshall and Caroline Islands from the requirements of U.S. laws, most federal environmental laws and programs, including the National Environmental Policy Act (NEPA), the Coastal Zone Management Act, Endangered Species Act, Marine Mammal Protection Act and SuperFund are all in effect. These laws and other laws and programs provide the legal basis for responding to many of the resource management problems confronting U.S. affiliated islands.

Existing natural systems management programs are characterized by four basic approaches: activity management; area management; sectoral management; and integrated management. Each of these approaches is discussed below.

Activity management refers to those programs which seek to insure that specific resource use activities are conducted in ways that minimize adverse impacts on resources. Dredging, for example, is regulated under Section 404 of the Clean Waters Act. A private developer or government agency is required to apply for a dredging permit from the Army Corps of Engineers before dredging can be undertaken. Similarly, the Environmental Protection Agency regulates the discharge of wastewater effluents under

Section 402 of the same act. Some continental jurisdictions regulate the location of power plants and other major facilities.

Activity management is a reactive type of management. Developers propose specific resource uses or activities at a specific site and regulatory agencies must decide whether the proposed uses is appropriate at that site or, if not, whether it can be modified to make it an acceptable use. In this approach to implementation, the types of resource impacts likely to be associated with the proposed use are likely to be well known. What is not usually know is the intensity of such impacts at the proposed site. The degree and type of analysis associated with activity management varies greatly. Site grading, for example is virtually unregulated in some jurisdictions. However, in Hawaii site grading has been recognized as a major factor contributing to turbidity in near shore waters and smothering of reefs. Hence, local ordinances set performance standards indicating maximum amounts of allowable sediment runoff. Regulation of other activities, such as dredging, usually requires some sort of environmental assessment, including formal environmental impact statements.

Area management refers to natural systems management programs that focus on specific geographic areas such as mangrove areas of an island deemed worthy of special protection. Most special area management programs are intended to achieve a single resource management objective. For example, the Water Bank Program for Wetlands Preservation administered by the U.S. Department of Agriculture authorizes ten year renewable agreements in which landowners are paid an annual fee for not destroying wetlands that serve as breeding areas for migratory waterfowl. The Federal Aid to Wildlife Restoration program administered by the Department of

Interior authorizes payment of funds to states for the acquisition, restoration and maintenance of wildlife areas. Other special area programs are authorized by the Rare and Endangered Species Act, the Coastal Zone Management Act and other federal programs. In addition to these federal laws there are a variety of other public and private special area management programs.

Special area management usually requires detailed analysis and planning. Once the purposes of special area management are agreed upon (e.g. habitat protection), the major analytic tasks involve resource surveys, mapping, boundary setting and the development of standards governing uses to be regulated. Such tasks may require resource specialists, particularly if the identification of resource subzones by means of soil maps, vegetation and other features is required.

Sectoral management refers to the management of a single resource such as forests or fisheries. The U.S. Forest Service and the National Marine Fisheries Service are examples of sectoral resource management agencies, although their management efforts place less emphasis on regulation and more emphasis on the dissemination of information than counterpart agencies in other parts of the world. At local governmental levels, sectoral management is exemplified by water management agencies.

Sectoral management usually involves substantial analysis of the supply and demand for specific resources. Hence, analytic techniques that provide information on sustainable yields and resource carrying capacity are likely to be most useful.

Integrated natural systems management refers to multi-sectoral, multi-disciplinary resource management efforts. At the national level, perhaps the best example of an attempt to create an integrated natural systems management program is the Coastal Zone Management Act. The law focuses on a specific geographic area---the coastal zone---and seeks to harmonize multiple management objectives within that zone by providing incentives to states to develop programs that incorporate both resource development and resource protection strategies. Comprehensive community planning efforts at the municipal level have the same multiple objectives and methods.

Integrated resource management plans are anticipatory in the sense of seeking to seeking to identify optimal uses of specific resources at specific sites in advance of actual development proposals. They are most frequently expressed in terms of both resource maps and detailed use guidelines. Hence, they frequently require a full range of resource analysis techniques.

1.3 Planning Constraints

There is no guarantee that planning will insure "better" natural systems management, although there is ample evidence that improved resource management is unlikely in the absence of planning. Planning processes sometimes go awry for a variety of reasons. Among these reasons a few deserve special mention in this paper: inadequate problem specification; lack of understanding of natural processes; inadequate specification of management alternatives; inadequate evaluation of alternatives; the use of planning as a substitute for management; lack of resources for planning; and lack of understanding for the social and political contexts in which plans are to be implemented.

a. Inadequate problem specification. In developing a natural systems management program there is always the possibility of inadequate problem specification or, to put it differently, of focusing on the wrong problem. For example, in several island groups, such as Hawaii, rapid population growth is seen as the primary problem that threaten sustainable use of natural resources. To the extent that population growth is seen as the major factor contributing to resource degradation and depletion, it becomes the focus of attempts to manage resources. While population growth is certainly associated with resource degradation and depletion, more careful problem specification requires an examination of the effects of population growth on resource use. One needs to ask what specific adverse resource conditions are associated with population growth and how such effects can be managed. Rather than trying to manage resource use by managing population growth---management efforts that are inevitably slow, long-term and, in the context of U.S. affiliated islands of dubious Constitutionality, management planning should be directed at more immediate and more manageable factors such as land use. In specifying resource management issues to be addressed, the central question should always be: What adverse natural systems conditions are we trying to avoid or reverse?

b. Lack of understanding of natural processes. Designing a resource management program requires a basic understanding of cause and effect relationships. To cite a simple example of a misunderstanding that is frequently made in island contexts, the design and construction of coastal works such as groins, marinas and harbors is all too frequently done without adequate understanding of how wave action and currents at the site affect sand transport. The consequences are frequently moderate to severe erosion of adjacent coastal environments requiring costly coastal protection structures.

c. Inadequate specification of management alternatives. Planners are frequently criticized for aspiring to be too comprehensive in the identification of alternative techniques for coping with some problem (see, e.g.Lindblom). In practice, however, the reverse is too frequently true. Too many contemporary resource management programs are "technique driven" rather than "issue driven." That is to say, some particular management technique such as transfer of development rights is touted as the management technique to be employed in dealing with particular resource management problems. Too little attention is paid to other alternatives or to the particular political and social context in which a resource management technique will be employed.

d. Inadequate evaluation of alternatives. Evaluation means, literally, to assess value or worth. A central problem in the evaluation of management alternatives then is the question of which values, or more particularly, whose values will be used to assess the worth of proposed management strategies. Planning is a technical or cognitive process. It is also a social process in which careful attention must be paid to those who will be most affected the management efforts. If those management alternatives do not reflect the most basic values of those who are most affected by the plan, the effectiveness of management efforts are likely to be undermined. The evaluation of alternatives is particularly critical in island environments in which the values of the planners are different from those of would-be clients. One way of insuring that the choice of management strategies reflects the values of clientele is to involve them more intimately in planning processes, particularly in the identification of problems and the generation and assessment of alternatives. (Participation need not be limited to the conventional approach of holding public hearings at which clientele are asked to respond to a completed plan.

e. use of planning as a substitute for management. Either by design or accident, planning sometimes becomes a substitute for management. Planning as an end in itself sometimes occurs because it was hoped that the activity would be a catalyst for generating public support for resource management activities that would be socially or politically divisive. When that support fails to materialize, the "plans" are left unimplemented. Sometimes planning activity is also encouraged as a symbolic activity to reassure people that "something is being done" about some problem or condition.

f. lack of resources for planning. One of the most common constraints which is perhaps most characteristic of island environments is lack of resources for planning. Planning, particularly natural systems planning, requires a substantial amount of skilled personnel, information and time. Those resources are frequently not available for natural systems planning or, when they are available, they are diverted to other planning enterprises that show more promise of immediate payoffs.

g. lack of understanding for the social and political contexts in which plans are to be implemented. As previously noted, successful plan implementation requires the understanding and support of those for whom plans are being developed. To the extent that the resource management programs that are designed do not reflect island values regarding man/environment relationships or cannot, through a process of community education, be shown to be consistent with those values they are not likely to be successful.

II. ANALYTIC TECHNOLOGIES

This section contains a brief description and assessment of several prominent techniques for generating and analyzing information for natural systems management. Included in this section are discussions of ecological baseline surveys, ecological monitoring, environmental impact assessments, post-project analysis, land suitability analysis, and carrying capacity analysis.

2.1 Ecological Baseline Surveys

Many jurisdictions rely heavily on environmental impact statements to provide basic information about the condition of natural systems. However, as many critics have observed, for all its usefulness as a basic information source, at best an EIS provides a static, geographic-specific "snapshot" of natural systems. One consequence, as Carpenter, et al note, is that when subsequent development are planned in the same area (e.g. in the same watershed) and a new environmental impact assessment is made, the same information is gathered again, with resultant duplication of effort and waste of scarce resources (Carpenter, et al).

One solution to this problem would be to put greater emphasis on the development ecological baseline surveys. An ecological baseline survey is a "comprehensive appraisal of important natural systems parameters at a given time (Carpenter, et al). Such baseline surveys "analyze and assess present characteristics, status and ecosystem processes such as productivity, nutrient cycling, seasonality in stream flow, temperature, faunal habitat requirements, endangered species lists, soil analysis (pH), soil moisture and organic content, and chemical properties of water" (Francis, et al). Resource inventories which identify natural resources in specific geographic areas and indicate their quality and variety are usually part of an ecological baseline study.

Although there is broad agreement among planners and resource managers about the potential value of ecological baseline surveys there are "virtually no examples of comprehensive, balanced environmental data collection and analysis programs, even in the most technologically advanced countries such as the United States" (Carpenter, et al). In my view, this situation reflects the jurisdictional fragmentation that characterizes natural systems management, the cost of developing such surveys, lack of agreement about what data should be collected and institutional uncertainty and lack of agreement about how such information should be collected, stored and made accessible. Several related issues need to be resolved as part of the development of ecological baseline studies:

What resource parameters are needed?

How and by whom will data be used?

How can data collection, storage and retrieval be done on a cost-effective basis?

In answering the question of what resource parameters are needed the first and most obvious place to begin is with the existing natural resource management agencies. What types of information do agency personnel use to make current resource use decisions? What types of additional information do they think they need? A supplemental strategy is to identify those ecosystems that are currently most vulnerable or "threatened" and to concentrate data collection on those ecosystems. Another approach is to recognize that for islands, particularly small islands, most resource uses and impacts are inevitably coastal and therefore data collection efforts should concentrate on coastal ecosystems. Towle underlines the importance of collecting coastal information in noting that "the central problem is the ignorance of most planners about marine ecosystems, resources, industries, uses and such things as ships, ports, fisheries and how to map corresponding data (Towle, 716). One author has gone a step further in identifying more specifically coastal ecosystem information that should be collected (Maragos, 276-279).

The primary uses of ecological baseline surveys would be planners and natural systems planners. Such people are generally at mid-levels in government agencies. The principal uses of such information are the preparation of land and water use plans and other program plans, project assessments, environmental impact assessments, area plans and in permit decisions.

The biggest challenge in promoting ecological baseline surveys seem to be in insuring that the collection, storage, and retrieval can be done on a cost-effective basis. For data collection, there are several issues: the number of natural system parameters on which data collection is to be collected, the geographic scope of collection efforts, and the skills and technological requirements of data collection. Obviously, the greater the number of variables and the greater the geographic scope, the more expensive it is to justify collection expenditures. One way to analyze the cost-effectiveness of baseline ecological surveys is to proceed incrementally by first seeking inter-agency agreement about what parameters to collect and then to collect information for a well-defined geographic area where resource use is high. This makes it possible to examine the utility of the information collected as well as the costs and skill requirements for collection.

Storage and retrieval presents a different set of problems. If data are to be mapped a scale has to be chosen that is appropriate for different users. Detailed mapping of the sort that is useful for permit decisions may result in maps that are too cumbersome for other uses. Some information may be stored and exchanged electronically, but experience has shown that such information storage and retrieval requires a great deal of advanced preparation time in developing formats for storage and protocols governing access.

There are, in brief, numerous impediments to the development of ecological baseline surveyed, but those impediments are not insurmountable, if agencies are willing to proceed on an incremental, experimental basis to develop the gathering, storage and retrieval capabilities.

2.2 Monitoring

Environmental monitoring refers to "subsequent measurements of natural resources and environmental quality parameters which must be collected in a standardized manner, to allow analysis of trends or departures from a standard--which result from either natural causes or human activities (Carpenter, et al, 5). Hence, ecosystem changes can be measured from a baseline at pre-planned intervals. The difficulties in developing and maintaining a monitoring system are comparable to those of developing and maintaining ecological baseline studies.

Ideally, monitoring of ecological parameters would be supplemented with indicators of resource development activities such as the number and location of permits issued. This would facilitate the collection of information regarding the rate and geographic distribution of resource use activities. This information could then be correlated with changes in ecological parameters (see, e.g., Nessa, et al).

2.3 Environmental Impact Assessment

The National Environmental Policy Act requires the preparation of environmental impact statements (EIS) for "significant" federal actions such as the construction of of ports and airfields. In addition, some states have their own EIS requirements covering certain land and water uses and/or all uses in select geographic areas.

Environmental impact statements are pre-project reports on possible positive/negative short term/long term impacts resulting from some public or private policy, program or project. Environmental impact statements usually emphasize potential impacts on natural systems, but some jurisdictions require more extensive analysis of potential impacts including impacts on publicly-funded infrastructure (e.g. streets, sewers), historic and archeological resources, demographic and other social and economic conditions.

Numerous publications have appeared which present rationales, methods and techniques for pre-project assessments (Ditton and Goodale, 1972; Stover, 1972; Barbaro and Cross, 1973; Burchell and Listokin, 1975; Corwin, et al, 1975; Rosen, 1976; Canter, 1977; Cheremisinoff and Morresi, 1977). Most environmental assessments contain at least the following elements:

1. A description of the proposed project or activity;
2. An identification of selected alternatives to the proposed project or activity;
3. A description of the existing conditions (natural, social) at the proposed project site;
4. An identification of the nature and magnitude of possible

project impacts at the proposed site.

Some impact statement laws also require the identification of trade-offs or possible mitigative actions.

Environmental impact statements are used both as an information base to aid policy-makers in deciding whether to allow a project to proceed and as a basis for designing strategies for mitigating potential adverse project impacts. The central assumption of EIS requirements is that cause and effect relationships between project activities and resource conditions can be identified with sufficient certainty to make them a valuable tool for analysis and decision making.

Impact assessment is the critical element of an EIS process. Ideally an impact assessment procedure should identify all the major impacts of a proposed project, both primary and secondary, as well as indicate their intensity and duration. Impacts arising from the interaction of two or more separate impacts should also be identified. Finally, the magnitude and significance of impacts should also be noted. These impacts should then be communicated in language understandable to policy-makers.

In practice, few environmental impact statements meet these ideal attributes. There are two major approaches to impact assessment that characterize most impact statements. The first major approach, and the simplest to administer, is the environmental checklist. Some EIA laws and regulations set forth checklists of potential impacts which must be included in an impact statement. The Battelle Institute was a pioneer in the development of checklists. In the Battelle checklist 78 specific environmental considerations were grouped into four general categories of ecology, environmental pollution, aesthetics, and human interest (Dee, _et al_). Such checklists provide a useful means of identifying potential impacts of interest, but they do not reveal the interaction, magnitude or importance of impacts.

Matrices represent a second technique for impact assessment. A typical matrix lists project actions along one axis and environmental conditions along the other axis. Such matrices differ in their level of complexity. One of the pioneering efforts in matrix construction identified 100 project actions along one axis and 88 environmental "conditions and characteristics" along the other axis (Leopold, et al). The matrix was used to make qualitative assessments of both the magnitude of specific project actions on specific environmental conditions (on a 1-10 scale) and the importance of such impacts.

Network techniques have also been developed to identify the chain of interactions which may be triggered by a proposed development. The underlying assumption of network analysis is that identification single cause and effect relationships is not sufficient; that project actions may institute a chain of impacts. Network techniques seek to identify potential secondary and tertiary impacts. One of the earliest attempts to develop a network approach was by Sorensen (1976). Efforts to construct environmental models to simulate environmental change are based on assumptions of network analysis (see, e.g., Holling).

2.4 Post-Project Analysis

In spite of EIAs and similar pre-project assessments, projects sometimes generate unanticipated negative impacts. Studies of water development projects, man-made lakes and agricultural development all reveal unanticipated consequences, some of which are substantial and severe. Post-project assessments provide a means of comparing impact predictions with actual impacts. Such post-project analysis may be particularly important in island environments as a test of the adequacy of current techniques and approaches to environmental impact assessment (Towle, [illegible]).

Post-project assessments are based on assumptions similar to impact assessment techniques. Post-project assessments should begin with pre-project documentations of potential impact, such as EIA statements, to assess the predictions of impact made. However, they should be sufficiently broad in scope to examine adverse impacts not revealed in pre-project assessments and to trace causal sequences linking project activities with such adverse impacts.

Post-project assessments are frequently regarded as a luxury that most jurisdictions cannot afford. However, if they should be regarded as a necessary supplement to environmental impact assessment which can be used to revise and reformulate EIS requirements.

2.5 Land Suitability Analysis

The purpose of land suitability analysis is to provide information about the supply of land at various levels of suitability for various uses. For example, some agriculture classification maps combine soil types with drainage characteristics to develop maps of agricultural productivity. Simple hazard maps sometimes map historic flood zones to identify areas unsuitable for urban uses. More complex suitability maps have been developed using multiple land characteristics, but the costs have been high and the results are frequently mixed.

Land suitability analysis usually involves several steps:

1. an identification of the land uses for which suitability is being determined;
2. an identification of the types of mapable biophysical land units that may occur in major landscapes and that are likely to respond in similar fashion to a perturbation or use;

3. an identification of the biophysical attributes of the land significantly affecting suitability (e.g. soil types. slope):
4. an identification of the significant categories of each attribute (e.g. how many soil types);
5. the determination of the degree of importance of each biophysical attribute and each sub-category of that attribute and the development of some type of rating system that makes it possible to combine attributes into an index of suitability for different combinations of land attributes and potential land uses;
6. the expression of these indices on maps.

A central problem in constructing land suitability maps is in developing methods for combining land attributes in ways that are practical, technically correct and easy to understand and communicate. Three basic approaches have been used: mathematical combination, regional identification and logical combination (Hopkins).

Mathematical combination involves trying to construct an index of suitability for each land use and type of land unit. Both linear and non-linear methods have been used. Linear methods involve assigning interval ratings to sub-categories of a particular physical attribute such as soil type. Then a multiplier---sometimes called an importance weight---is assigned to each attribute. These numbers allow for the calculation of weighted averages. Non-linear methods of constructing indices of land suitability assume that land attributes are interdependent. Hence, if appropriate relationships among attributes are known and can be expressed as mathematical functions a non-linear approach to index construction would more accurately reflect underlying relationships. In practice, however, such relationships are poorly understood and, to the extent that they are understood, they do not lend themselves to easy application in standard resource management.

The regional identification approach involves identifying sub-regions within a larger geographical area that are homogeneous with regard to important attributes such as vegetation and slope. Indeed one such suitability map used two attributes, forest cover and topography, to generate five relatively homogeneous sub-areas of a region: valley floors, unforested valley walls, forested valley walls, forested plateau and unforested plateau. The suitability of each type of sub-region for various types of land use can then be identified.

Logical combination approaches assign suitabilities to sets of attributes rather than single attributes and are expressed in terms of verbal logic rather than in terms of quantitative indices. For example, a set of simple rules can be derived that take into consideration the inter dependence of slope, soil permeablity and sub-surface material in determining suitability. Assuming two slope types, greater than 25% and less than 25%; two soil types, well-drained and poorly-drained; and two sub-surface materials, clay and not-clay. High suitability might include land units with slopes less than 25% or land units with slopes greater than 25% and poorly drained soils or units with greater than 25% and not clay sub-surface. Low suitability would include units with slopes greater than 25%, well-drained soil and clay sub-surface (Hopkins).

The logical combination approach to suitability analysis would seem to offer the most promise in island contexts. The rules are explicit, can be developed on the basis of known interdependent attributes and are easy to communicate.

Although developing land suitability maps for island resource management may be appropriate and useful, a more immediate application, it seems to me, may be ocean and near-shore suitability analysis. The same principles of logical combination of interdependent attributes that characterize the construction of land suitabilities might also be used for mapping near shrore areas suitable (and unsuitable) for various types of ocean-dependent uses.

2.6 Carrying Capacity

The concept of carrying capacity was originally conceived by animal ecologists. In this context, carrying capacity might be defined as the "maximum number of grazing animals of a given class that could be maintained in 'good flesh' year after year on a grazing range without damage to the forage, growing stock or to the soil" (Dasmann, 400). Some planners and resource managers have considered applying this concept more broadly to develop an "environmental carrying capacity;" that is an optimal human population that can be supported at given levels of technology and amenity. To date the results of these efforts have been limited. Some useful research has been conducted on defining biophysical and behavioral carrying capacities. Biologists and foresters, for example, have focused on biophysical phenomena by trying to identify critical thresholds beyond which physical (e.g. soils, geomorphology) and biological (e.g. vegetation, wildlife) phenomena are significantly degraded or depleted (Mitchell). Studies have been conducted concerning the effects trampling on trails and ski areas (Liddle), sand dunes along the coast of North Wales (Liddle and Greg-Smith, 1975a, 1975b) and trails in Teton and Yellowstone National Park (Dale and Weaver) as well as many other recreational areas.

Other researchers have studies behavioral carrying capacities. Some of this research has focused on congestion among recreational users.

Recreational users are interviewed to determine what influences their enjoyment of resources and the levels of resource use at which their enjoyment declines (e.g. O'Riordan).

Islands would seem to be ideal contexts for applications of the carrying capacity concept because one is dealing with natural systems that are, at least relatively speaking, more "closed" and thus more amenable to analysis. Research conducted in Hawaii on broader applications of the carrying concept illustrate both the promise and the limits of the concept.

In 1973, the Hawaii legislature authorized the creation of a Temporary Commission on Statewide Environmental Planning. The Commission's report highlighted the danger of exceeding carrying capacity and the need to develop tools to anticipate overload problems and to develop growth alternatives that would either prevent or at least minimize future overload conditions. In 1974, the legislature passed three resolutions requesting the governor and the Department of Planning and Economic Development to establish criteria which could then be used to limit, restrain or redirect the state's growth. Several studies were commissioned to establish carrying capacities for various systems or areas.

The basic steps in the analyses included the following:

1. Identification of major systems necessary for regional development;
2. Identification of geographic areas for application of carrying capacity analysis;
3. Definition of limits of "critical systems" (i.e. those systems with capacities that have been exceeded or are close to overload conditions;
4. Measurement of current utilization of critical systems;

5. Determination of margins for growth.

One of the difficult analytic issues is whether to focus the analysis on a single resource or develop a more integrated approach. Focus on a single resource is analytically less complex, but as the authors of a one of the carrying capacity studies on Oahu notes:

"In analyzing the impact of growth from the perspective of single system only, it is necessary to make certain assumptions related to other systems in order to start estimating potential limits to growth. Thus results from a single system analysis can only be partial. For example, a given level of available water supplies on Oahu coupled with an economic standard related to the maximum allowable cost for residential water may imply the desirability of modifying the land use plan in order to reduce the cost of transporting water and thereby increase the residential carrying capacity. However, the option of reallocating growth through a land use plan change must also be evaluated from the perspective of its impact on air quality transportation demands, cost of housing in the new location, etcetera, prior to making an informed decision" (Governor's Steering Committee, 8).

More generally the carrying capacity studies in Hawaii were complex and expensive without revealing "critical thresholds" for resource use. Carrying capacity was not particularly useful in providing a scientifically determined population limit for particular geographic areas although it was somewhat useful in substantiating critical resource use decisions to be made (HESL, Lowry). As Mitchell notes, the final decision about carrying capacity is always an arbitrary one (Mitchell). Someone, somewhere must decide what constitutes an undesirable change in land or water use or crowding and congestion.

2.7 Comparison of Alternatives

Figure 2 contains a summary comparison of the analytic techniques in terms of relative development and maintenance costs, utility for natural systems managers and level of skills required for use of the technique. This assessment is necessarily crude and general because costs, utility and skill levels are highly dependent on particular applications of the techniques.

In the short run, environmental impact statementsare likely to remain the primary technique used by island resource managers for natural systems assessment. This current emphasis on EIS is a function of the current dominance of activity management as the primary approach to natural systems management and the availability of several "off the shelf" approaches to impact assessment that make it cheaper and easier. However, current procedures for conducting EIS should be reviewed to explore the possibility of developing more "island relevant" EIS procedures. One way to facilitate the development of more appropriate approaches to EIS development in island contexts is to conduct more post-project assessments. Such post-project assessments could be extremely useful in revealing the strengths and weaknesses of current EIS procedures.

Ecological baseline surveys and monitoring offer another very promising approach to natural assessment. At present, their developmental costs are high because of a lack consensus about what parameters to monitor and how to make such surveys operational in island contexts. Given the critical need for information about baseline conditions against which to measure change, environmental baseline surveys offer one of the most promising approaches for the near future.

Capability assessments have some promise but because they usually

Figure 2: General Comparsion of Analytic Techniques

Techniques	Development costs	Maintenance costs	Management utility	Skill levels
Environmental Impact Assessment	Low	N.A.	a,c	Mod
Post-Project Assessment	Low	N.A.	a,b,c	Mod
Ecological Baseline Surveys	High	Low.	a,b,c,d	Mod
Ecological Monitoring	Low	Mod	a,b,c,d	Mod
Land Capability Analysis				
Mathematical Combination	High	N.A	b,c	High
Regional Identification	High	N.A.	b,c	Mod
Logical Combination	Mod	N.A.	a,b,c	Mod
Near-Shore Capability Assessment	Mod	N.A.	a,b,c	Mod
Carrying Capacity				
Single System	Mod	Mod	b,c,d	High
Integrated Analysis	High	Mod	b,c,d	High

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a = high utility for activity management
b = high utility for area management
c = high utility for sectoral management
d = high utility for integrated management

require high levels of expertise and because their value is certainly questionable in the context of small islands they have not been rated as highly here as other techniques. However, the possibility of constructing capability analyses for near-shore waters has much more potential and should be explored further.

Carrying capacity analysis also has limited immediate potential because of the costs and skill requirements. However, on some islands the carrying capacity analysis of some systems, such as water supply, may be useful.

III. IMPLEMENTATION OF ANALYTIC TECHNIQUES

This section identifies some of the primary considerations in the selection and implementation of specific techniques in institutionalizing mechanisms for gathering and analyzing information for natural systems management.

3.1 The identification of specific information needs and analytic techniques for natural systems assessment should be based on an analysis of current and projected planning and regulatory information needs.

Recommendations about what information and analysis is needed to improve resource use decisions should be based on analysis of current and projected planning and regulatory information needs. The general relationship among management approaches, management techniques and information needs is illustrated in Figure 3. User needs vary significantly among different users on different islands. A more detailed survey should be done on each island of what types of resource use decisions are currently being made, the type and quality of information and analysis on which these decisions are based, availability of advisory services.and access to

Figure 3: Types of Information Needs and Analytic Tools for Different Approaches to National Systems Management

Natural

Implementation Focus	Examples	Typical Implementation Tools	Information Needs	Analytic Tools
activity management	siting of facilities, dredging	permit system, construction standards standards	site-specific resource impacts	environmental impact statements, ecological baseline surveys
area management	coastal wetlands	critical area designation; permit system	existing resource characteristics, productivity	ecological baseline surveys, suitability analysis
sectoral management	water, forests	permit system zoning	resource supply/ demand/quality	ecological baseline surveys, carrying capacity
integrated management	coastal zones	permits, zoning critical area designation	resource/supply demand/quality	ecological baseline survey, carrying capacity

data bases in other agencies. Detailed information is also needed about the present scope of data collected, methods of data acquisition, frequency, geographic scale, format of presentation, accessibility and costs of collection (Carpenter, et al).

Current resource management programs sometimes reflect federal requirements or the availability of funds for management rather than locally-perceived management needs. Hence, the survey of planners and resource managers should also address the issues of current resource use problems that are under-managed and anticipated future resource use problems for which information will have to be gathered for future management efforts.

3.2. Opportunities for sharing existing federal and local data should be assessed prior to gathering more data.

It is important to be familiar with the availability and use of various forms of data acquisition and management technologies, particularly to avoid duplication and to take full account of experience gained (Carpenter, et al). Experience in a number of states has indicated that agency personnel are frequently unfamiliar with data collected by personnel in other agencies or, if they are aware of data acquisition efforts, there are frequently questions about the quality of the data and difficulties getting access to data bases on a timely basis. What is needed initially is an island-by-island assessment of what data are collected and by whom. Such a data inventory could be a first step toward identifying opportunities for sharing data and collaborating on the acquisition of additional data. Such a preliminary study should also identify current incentives and constraints for sharing data. The long term goal would be inter-agency protocols for the acquisition and sharing of data useful to several agencies in their natural systems management efforts.

3. Priorities should be established for the acquisition of new data or the development of an inter-agency data bank.

Even if initial surveys indicate that a substantial amount of new data are needed to supplement existing data, few islands can afford a major data acquisition effort. Priorities should be established for data acquisition. An initial priority is to insure that essential data are being collected. Essential data are those which, if lacking, prevent program implementation.

After insuring that essential data are being collected, an incremental approach to collecting desirable data can be established. One approach is to gather natural system data on a case-by-case or area-by-area basis. This approach allows managers to determine what the costs of data acquisition are, what ecological parameters are most useful and what the requirements are for a larger scale data collection effort. Initial data collection efforts may also be concentrated in areas where development pressures are the greatest in order to identify baseline conditions from which trends in resource conditions can be determined.

4. Strong local participation in data collection efforts is essential.

Because of traditional man/environment relationships, rural island residents are frequently the best source of information based on intimate, long-term familiarity with an area's resources and trends. The data may be compiled from surveys, workshops and other techniques.

5. Data acquisition, storage and retrieval should be based on appropriate technologies.

The availability and continuing improvement in remote sensing and electronic data processing poses a dilemma for island natural systems managers. These technologies are frequently expensive, require high levels of skill and are being modified so rapidly that knowing whether investments are warranted and, if so, which technologies are most appropriate for island management is an issue that has to be addressed on a case-by-case basis. Here again, an incremental strategy of focusing on training and demonstration projects is probably warranted.

6. Emphasis should be placed on dissemination as well as acquisition of data.

Too often, large sums have been spent on data acquisition with little attention to distribution. Distribution of data to users may be encouraged through preparation of data lists and inventories, reproducing reports, air photos, topographic maps and the like, sponsoring workshops and seminars and adopting an "open files" policy for other agencies (Kusler).

IV. SUMMARY: PROBLEMS AND OPPORTUNITIES

The development and implementation of analytic technologies for natural systems assessment in U.S. affiliated islands is constrained by:

1. lack of information about the existing natural systems management structures in U.S. affiliated islands and, in particular, about strategic agencies within that management structure involved in natural system management;
2. lack of information about existing information bases and analytic capability within both key management agencies in U.S. affiliated islands;
3. lack of information about needs for more information for natural systems assessment as perceived by both island planners and

managers and federal agency officials with legal responsibilities for natural systems management in U.S. affiliated islands;

4. lack of agreement about priorities for increasing information bases and analytic capability;
5. institutional fragmentation and lack of coordination among federal agencies with legal responsibility for natural system management in U.S. affiliated islands;
6. varying levels of institutional support and administrative capacity in U.S.-affiliated islands in developing and maintaining more sophisticated approaches to natural systems assessment, planning and management.

On the positive side, the sponsorship of a project on Integrated Renewable Resource Management for U.S. Insular Areas by the Office of Technology Assessment, U.S. Congress, the designation of 1986 as the "Year of Islands" by the International Union for Conservation of Nature and Natural Resources, the sponsorship of a program on Ecological Baseline Surveys and Monitoring by the East-West Center, University of Hawaii and many similar projects all suggest that natural systems management problems of islands are beginning to receive the attention and support they require.

Integrating new analytic techniques into existing natural systems management structures in U.S.-affiliated island will require special attention to implementation issues. What is needed is an adaptive, experimental approach to the development of appropriate information bases and analytic technologies to support natural systems assessment and management in U.S.-affiliated islands. This adaptive approach should include assessments of the existing capabilities for resource assessment in island environments, workshops to set priorities for future approaches to data gathering and analysis, training, demonstration and greater coordination among U.S federal agencies with jurisdictional responsibilities for resource management in U.S. affiliated islands. The adaptive approach should allow for needs assessment, formulation of proposals for natural systems data gathering and assessment, field testing and refinement of assessment techniques and broad dissemination of ideas about assessment techniques appropriate for island environments.

4.1 Objectives of Congressional Action

The objectives of Congressional action should be to:

*Promote sustainable resource uses on U.S-affiliated islands:

*Insure that federally-funded or sponsored projects on U.S.-affiliated islands are based on analyses of their impacts on sustainable uses of resources.

4.2 Specific Elements of an Action Plan for Promoting Increased Natural Systems Assessment.

An action plan for promoting increased natural systems assessment capability among agencies concerned with natural systems management in U.S.-affiliated islands should include the following elements.

1. Conduct a reconnaissance of current natural systems assessment practices in U.S.-affiliated islands.

Such a reconnaissance should indicate which agencies (both federal and insular) have major natural systems management responsibilities in U.S-affiliated islands, the legal basis of those responsibilities, and existing natural systems management mechanisms. It should also indicate the type and quality of existing information for management, existing technologies for data manipulation, perceived gaps in information and existing management problems as perceived by agency personnel and knowledgeable observers.

Implementing Agencies: The International Union for the Conservation of Nature and Natural Resources is currently supporting the preparation of National Conservation Strategies in several countries. These NCS statements could provide a point of departure in the design of this reconnaissance. Coordination could be provided by the East-West Center, University of Hawaii, which has already done some research on this topic or the National Coastal Resources Research and Development Institute recently established by Congress. Supplementary funding for this project could be provided by Congress, the National Science Foundation or Sea Grant.

2. Establish protocols for sharing data among agencies.

Several federal agencies collect natural systems data on a regular or episodic basis. For example, the Army Corps of Engineers has funded several coral reef inventories in the Pacific. It is not widely known what data is being collected by each agency, the geographic scope of collection efforts, methods of data acquisition, frequency of collection efforts or presentation format. Federal and insular agencies need to know what data bases are available and how to gain access to them. One short range option would be to prepare a data directory for U.S.-affiliated islands indicating what data are available and specific means of gaining access to the data.

Implementing Agencies: U.S Congress would initiate this activity. Department of Interior might prepare the directory.

3. Continue funding of existing federal data collection efforts.

Limited funds have constrained the continuation of some natural system data collection efforts such as the coral reef surveys funded by Section 22 of the Water Resources Development Act. These data collection efforts should be continued and even expanded as soon as priorities can be established about what data should be collected (see recommendation 5 below).

Implementing Agencies: U.S. Congress for additional funding. Army Corps of Engineers, Fish and Wildlife Service (for habitat data), U.S. Geological Survey.

4. Insure that existing federal data collection collection programs contain an explicit training component.

Federal data collection efforts whether conducted by agency personnel or by consultants should contain an explicit training component. Island planners and resource managers should participate in every phase of the design of data collection methods and in the actual collection. They should participate either as full colleagues or as trainees depending on their previous training and skill. The purpose of this recommendation is both to enhance the skills of island planners and managers, to increase the possibility that data are collected in culturally appropriate ways and to increase the possibility that data will ultimately be used in natural systems management.

5. Establish priorities in data collection and development of natural systems assessment techniques.

Natural systems problems vary from island to island. Hence, priorities for data collection and the development natural systems assessment techniques are likely to vary as well. However, as a way of mobilizing interest in the topic of information gathering and analysis I would recommend a series of regional workshops that explicitly links information to management needs. The purposes of the workshops would be to critically examine current information bases used for management, to identify information gaps, to examine several acquisition and assessment strategies and to begin to develop a data acquisition and assessment agenda for each island. Particular emphasis should be placed on adapting EIS requirements to island conditions and exploring the potential for ecological baseline surveys as major assessment tools.

Implementing Agencies: East-West Center, National Coastal Resources Research and Development Institute or Department of Interior.

6. Conduct demonstration projects on natural systems assessment techniques.

Demonstration projects integrating new natural systems assessment techniques into ongoing natural systems management program should be established. Such demonstration projects make it possible to show potential users of a technology the practical strengths and weaknesses far more effectively that can be done with papers, seminars or workshops.

Implementing Agencies: Army Corps of Engineers, Department of Interior, island governments.

7. Provide broad dissemination of exemplary project or program assessments.

It is not always cost-effective to bring people to demonstrations. One complementary strategy for developing awareness and skills is to insure broad dissemination of exemplary assessment reports and memoranda to island planners. A regular mechanism for collecting and distributing examples of natural systems assessment should be established and maintained.

Implementing Agencies: East-West Center, NCRDI or other academic institution.

8. Establish training programs in natural systems assessment technologies.

Training is a critical element in a general strategy to increase the quality of natural systems assessments. A variety of training mechanisms should be developed, including incorporating more island planners in federal data collection efforts, organizing short courses and workshops on assessment strategies and providing more scholarships for island planners and managers to develop expertise in hydrology, biology, botany, oceanography, zoology and other resource management disciplines.

Implementing Agencies: East-West Center, Department of Interior.

9. Field test emerging techniques in natural systems assessment.

There are several rapidly evolving tools of resource assessment including remote sensing and electronic data processing. Island planners should have opportunities to see and compare operational tests of these technologies prior to making commitments for investments in any particular system. An academic institution could provide a clearinghouse role for new technologies by developing field tests of such technologies.

Implementing Agencies: East-West Center, Department of Interior.

10. Congress should insure that federally-funded or sponsored projects or programs on U.S.-affiliated islands are based on an analysis of their impacts on sustained uses of resources.

Direct federal expenditures for major projects are usually covered by NEPA requirements. However, some projects and programs using federal funds are not covered by EIS requirements or other natural systems techniques. Congress can require comprehensive assessments of projects and program impacts as a pre-condition of continued funding.

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APPENDIX

The Office of Technology Assessment conducted a survey of resource development planning and management offices in U.S.-affiliated islands in April 1986. Respondents were asked to comment on how important they perceive the planning constraints identified on pages 13-15 of this paper to be, whether their office uses any of the analytic techniques described in this paper, the types of information needed for resource development in their agency and the actions they think would do the most to improve resource development planning on their island. Of the 31 surveys that were sent out only seven were returned.

Of the seven responses that were returned it is worth noting that six respondents indicated that a lack of understanding of natural processes is one of the most important planning constraints confronting island planners and resource managers.

One particularly thoughtful response is worth quoting at length:

"At the present, resource development planning appears to be non-existent or conducted in an extremely haphazard way. Meetings are called to deal with specific problems (e.g. illegal dredging at a particular site), a decision is made to deal with this problem, and on attempt is made to develop coherent plans dealing with similar problems which will inevitably occur.

"Resource managers in the Pacific are faced with the following problems:

1. inadequate biological and baseline data for organisms or resources to be managed;
2. lack of training for personnel to perform any techniques such as ecological baseline surveys, monitoring, or analysis, project management and report writing;
3. inadequate funding;
4. common perception locally that resource development does not need management (or perhaps management is not politically feasible, with strong pressure for development).

"I feel that improving resource development planning can be accomplished by:

1. funding for basic research on biology of certain important organisms;
2. funding for baseline data collection (including training of local people in these techniques;
3. technical assistance in resource assessment and drafting legislation for resource management;
4. information dissemination concerning resource development planning in other localities."

Background Paper No. 2

COASTAL RESOURCE DEVELOPMENT AND MANAGEMENT IN THE U.S. PACIFIC ISLANDS

by

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SECTION 1:

GEOGRAPHIC DESCRIPTIONS OF THE U.S. PACIFIC TERRITORIES AND STATE

ABSTRACT

This report (Part I) evaluates the distribution, history, and status of coastal resources and related economic development in the tropical Pacific islands presently under U.S. control or jurisdiction. These are Hawaii, the Marianas, eastern Samoa, some of the Line Islands, the Marshalls, the Carolines, and other isolated islands. The Marshall and Caroline Islands are now in political transition; since the end of World War II they have been a part of the U.S.-administered Trust Territory of the Pacific Islands (TTPI), and soon will emerge as three sovereign nations in close association with the United States. The remaining islands are U.S. sovereign territory.

The islands are situated in parts of Polynesia and Micronesia which were originally settled by peoples migrating from Southeast Asia during the past several millenia. The indigenous islanders engaged in subsistence-level horticulture and fishing. The first Western contacts were from explorers, traders, whalers, and missionaries during the 16th through 19th centuries. The Spanish were the first to exert colonial influence, especially in the Marianas, but the Germans (in the Marshalls, Marianas, and Carolines) and the Americans (in Guam, Hawaii, Lines, American Samoa) emerged as the principal powers by the turn of the century. During World War I, Japan seized the Northern Marianas, Carolines and Marshalls, and developed and colonized many of the islands. The U.S. has administered these areas as the TTPI since Japan's defeat in World War II. The indgenous populations in most of the areas have been decimated during the past one to three centuries by diseases, warfare, forced migrations, and confiscation of subsistence lands and resources. However, improved health care, sanitation, nutrition and the lack of warfare during the past for decades have fueled dramatic population growth, urban drift, and both economic prosperity and poverty. The present island populations consist of Pacific islanders, Caucasians, Asians and mixtures of the three races.

Since the war, standards of living and economic development have risen dramatically in Hawaii and are showing similar trends in Guam. In contrast, the Carolines, Marshalls, and American Samoa are still relatively undeveloped. Remaining U.S. islands are either rural, agricultural plantations (especially copra), wildlife refuges, military installations, or uninhabited. The major economic mainstays of the region are government employment and subsidy (including military development), tourism, and some agricultural and fisheries export. Tourism is growing rapidly, and there are plans to stimulate more agricultural and fisheries development. Other economic activity has included mining (Palau), tuna canneries (American Samoa), and service industries and retailers in the urban centers. The government has developed airfields, ports, roads, water supply, some sewage treatment projects, and other infrastructure in the urban centers.

Important coastal resources include coral reefs, lagoons, mangroves, estuaries, beaches, seagrass beds, streams and coastal marshes. Urbanization, agriculture, and military activity have caused severe impacts to these resources in the more developed islands (particularly Hawaii). In other areas soil erosion and sedimentation from land clearing; dredging for ports, airfields, roads and military construction; nuclear weapons testing; mining of construction aggregate; landfilling for transportation and residential development; heavy fishing pressure; and illegal fishing techniques (especially from the use of dynamite and laundry bleach) have caused significant adverse impacts to coastal resources. Government controls over coastal development and conservation is still inadequate in the less developed islands, especially the Carolines and Marshalls.

INTRODUCTION

The Office of Technology Assessment (OTA) asked me to prepare an overview (totalling less than 50 pages) describing the coastal resources, related cultural history, coastal development and resource conservation needs of all of the U.S. territories and possessions in the tropical Pacific Ocean. OTA further requested I evalute existing legislative and administrative mechanisms responsible for management of coastal resources in these same areas, and offer solutions to the significant problems including remedies that could be addressed by the U.S. Congress. It was not possible to accomplish this enormous task in so short a space, and I have divided my final report into two parts. The first (this report) gives an island-by-island compilation of the physiography, history, coastal resources, socio-economics, and coastal management problems and needs in the U.S. insular Pacific. The second report analyzes the significant problems, various laws and regulations responsible for environmental protection and conservation, and introduces possible solutions to those problems.

Coastal resources are defined here as natural ecosystems associated with or dependent upon the coastal zone with significant economic, subsistence, artisanal, or recreational value. These specifically include (but are not limited to): coral reefs, seagrass beds, mangrove swamps, estuaries, sand beaches, coral islets and cays, lagoons, tidal mud flats, river and stream deltas, and nearshore or coastal pelagic, benthic, and demersal fisheries. In additional, agroecosystems are well established on some islands, but commercially valuable mineral and energy reserves are generally absent. Treatment of the exclusive economic zones or EEZs (beyond the near coastal zone to the 200-mile "limit") is beyond the scope of both papers.

Politically, the U.S. tropical Pacific includes:

(1) the State of Hawaii;

(2) the "flag" territories of Guam, Northern Marianas, and American Samoa;

(3) a number of sovereign but unincorporated or unorganized U.S. island possessions, including Johnston, Wake, Midway, Palmyra, Kingman Reef, Howland, Jarvis, and Baker; and

(4) the Marshall and Caroline Islands, which were until recently administered by the U.S. as part of the Trust Territory of the Pacific Islands.

This last category is in political transition, and once the Compacts of Free Association are ratified by the United Nations (perhaps as early as July 1986), the Marshall and Caroline Islands will officially divide into three new political entities: the Federated States of Micronesia, the Republic of the Marshall Islands, and the Republic of Palau. These will constitute sovereign nations in close association with the United States. The U.S. commonwealth status of the Northern Mariana Islands will also be officially recognized upon U.N. ratification, although the Northern Marianas have been functioning as a sovereign territory of the U.S. since 1976.

Other Indo-Pacific tropical and subtropical islands and reefs no longer under U.S. claim or control will not be covered in this report. These include Okinawa, Philippines, Diego Garcia Atoll, Canton Atoll, Enderbury Atoll, and Marcus Island (Minami Tori Shima). Reference to Hawaii in this report will be limited to offering a comparison to the rest of the U.S. tropical Pacific in terms of economic development, history, and coastal resource management from a government perspective. Traditional forms of coastal resource management are discussed by Johannes (1986).

The island-by-island overview constituting the rest of this report is divided into three sections: the first covers the State of Hawaii and the three "flag" territories; the second covers the remaining U.S. sovereign island possessions; and the third covers the Caroline and Marshall Islands, formerly of the Trust Territory. In-text citations are kept to a minimum for brevity. Selected references for each of the major islands and island groups are compiled in the bibliography at the end of this report.

A. GEOGRAPHIC DESCRIPTIONS OF THE U.S. PACIFIC TERRITORIES AND STATE

STATE OF HAWAII: PHYSIOGRAPHY

The State of Hawaii is a 1,000-mile long archipelago stretching from 178°W/28°N to 155°W/19°N (Map 1). It includes over 7,000 square miles of land area. The Hawaiian Islands and the drowned northwest extensions of the chain (Emperor Seamounts) formed over a relatively stable "hot spot" on the ocean floor as the north Pacific crustal plate slowly but steadily moved northwest throughout most of the Cenozoic. The islands increase in age from the southeast to the northwest end of the chain. The youngest southeastern islands are typically large, high and volcanic in origin, with abundant rainfall and a variety of terrestrial biotopes. Living coral communities are well developed, but structural reefs are poorly to moderately developed. Included in this group are Hawaii, Maui, Oahu, Kauai, Molokai, Lanai, Niihau, and Kahoolawe.

The volcanic islands in the middle part of the archipelago are older and much smaller, having been subjected to subsidence, soil erosion and wave attack. These include Kaula, Nihoa, Necker, Gardner Pinnacles, and La Perouse Rock within French Frigate Shoals, and are mere outcrops or seastacks. The rest of French Frigate Shoals, Laysan, Pearl and Hermes, Maro Reef, Lisianski, Midway, and Kure (all coral atolls and islets) comprise the oldest northwest end of the chain.

History

Hawaii was first settled before 750 A.D. by Polynesians probably migrating north from the Marquesa Islands. They established large, stable communities on all of the main (larger) islands and subsisted primarily upon taro, yams, bananas, pigs, chickens and fish. After western contact was made by Captain James Cook in 1778, Hawaii underwent two centuries of dramatic change. The subsequent missionaries, whalers, and traders brought along with the western concept of a cash economy and private land ownership as well as diseases to which the Hawaiians had no immunity; the Hawaiian population declined dramatically in the mid-1800s. The Great Mahele of 1848 also enabled newcomers to obtain fee title to land, causing the rise of plantation agriculture for sugar cane, rice and pineapple, and large scale ranching. Immigrant labor from China, Japan, Korea, Philippines, Azores, Puerto Rico, Spain and elsewhere worked the plantations which dominated island economics well into the early 20th century. Except for a few months in 1843 when the islands were under the British flag, Hawaii was an independent state until the end of the 19th century. The U.S. accepted jurisdiction over the islands in 1898, shortly after the Hawaiian monarchy was overthrown (1893). At the turn of the century, the U.S. Navy established a coaling station at Honolulu and later at Pearl Harbor; the Army established Fort Shafter and Schofield Barracks. Military and civil federal expenditures gradually increased in the Territory of Hawaii, culminating in major military and urban development before and during World War II. After the war, federal expenditures remained high, tourism began to rise, and agriculture began to decline.

Socioeconomics

Hawaii became the 50th state in 1959 and is now the most populated and economically developed of all the tropical Pacific regions under U.S. control. The political, industrial and economic center of the state is Honolulu; nearly 80 percent of the Hawaiian population resides in the city or elsewhere on Oahu. The large reservoir and accessibility of groundwater enabled rapid agricultural and urban growth on Oahu and to a lesser extent on the other inhabited high islands (Hawaii, Maui, Kauai, Molokai). A small Hawaiian settlement persists on Niihau (which is privately owned), and small federal facilities are maintained at French Frigate Shoals (U.S. Fish and Wildlife Service), Midway (U.S. Navy) and Kure (U.S. Coast Guard).

The remaining islands serve either as Navy bombing ranges (Kahoolawe, Kaula) or wildlife refuges (particularly the northwest islands). Presently, the Hawaiian economy is based on tourism, federal programs (especially defense) and agriculture, in that order of importance. Light industry and manufacturing are locally important in major towns on the main islands, and commercial fishing is a small but widespread island industry which recently expanded into the northwest end of the chain. Agriculture continues to decline (except for the illegal harvest of marijuana), and many agricultural lands have been converted to residential and commercial use over the past four decades. In per capita income, health, education and standard of living, Hawaii far surpasses any of tha U.S. Pacific territories, but there is great disparity among certain ethnic groups. Caucasians, Chinese and Japanese are generally better off than most of the newcomers (Filipinos, Puerto Ricans, Blacks, Samoans, Koreans, Vietnamese). However, many native and mixed Hawaiians remain poor, having been dispossessed of their ancestral lands and of much of their language and culture.

Important Coastal Resources

When Cook arrived (1778), Hawaii's terrestrial ecosystems were characterized by a high diversity of endemic species. Hawaii's tropical marine ecosystems are more impoverished due to sub-optimal environmental conditions (i.e., a subtropical climate) and geographic isolation. Coral communities (including associated fish, algae and invertebrates) are widespread but best developed in wave-protected, shallow, warm waters away from riverine discharges. Other important coastal ecosystems include marshes, stream and stream-mouth estuaries (confined to most of the high islands), lagoons (confined to the atolls and one bay off Kaneohe, Oahu) and beaches. Seagrass beds are very rare and poorly developed; mangroves were absent altogether from Hawaii until Rhizophora, brought in as an ornamental plant at the turn of the century, began to spread rapidly throughout the main islands. Early Hawaiians constructed many rock-walled fishponds along the coasts of several high islands. The ponds remaining on Oahu, Molokai and Hawaii provide important estuarine, fishery and wetland habitat. Among Hawaii's unique marine and fresh water habitats are anchialine ponds and the estuary in Pearl Harbor. Coastal fishery resources are heavily exploited for recreational and quasi-commercial purposes, especially off Oahu and the other main islands.

Management Problems

Many endemic species have become extinct or displaced by exotics brought to Hawaii, especially by the westerners. Terrestrial systems, which are geographically more isolated, have been most vulnerable to displacement. Agricultural development and overgrazing of rangelands and ranchlands also contributed to the decline of native terrestrial ecosystems, and to soil erosion and sedimentation of streams and coastal waters. Historically, sugar cane milling added sediment-laden wastewater to coastal environments along agricultural shorelines. This degraded coral reefs and perhaps other marine ecosystems, although undocumented except off Hamakua (Hawaii), Kaneohe Bay (Oahu), south Molokai, north Kauai, and Kahoolawe. In Kahoolawe, denudation of ground cover from overgrazing reduced rainfall percolation and dried up springs and water supplies. Much of the irrigation water needed for plantation agriculture on the other high islands was diverted from perennial streams, especially on Oahu, Kauai, Molokai, Maui and Hawaii, and some stream and wetland systems suffered.

The era of major military and urban development in Hawaii led to considerable damage and destruction to wetlands and coral reefs. Dredging at large military bases at Mokapu and Pearl Harbor on Oahu; and the construction of deep water civilian navigation channels and ports at Kaneohe, Honolulu, Kahului, Kawaihae, Port Allen, Barbers Point and Hilo caused major environmental damage. The construction of small boat (shallow draft) harbors at Heeia, Haleiwa, Ala Wai, Waianae, Lahaina, Maalaea, Manele and elsewhere also involved some dredging and filling of reefs, as did recent construction at the Honolulu international airport.

Expansions of residential and commercial areas necessitated filling in historic Hawaiian fishponds (especially off Kaneohe Bay, south Molokai and south Oahu) and draining and filling many coastal marshes, including Ala Moana, Waikiki, Salt Lake, Kuapa (Hawaii-Kai), Kaelepulu (Enchanted Lakes). Wetlands at Kawainui, Heeia, Kealia and elsewhere are threatened. Because of wetland losses, all four of Hawaii's endemic waterbirds are now listed as endangered species.

The dramatic growth of the human population has increased sewage discharges into coastal waters with major impacts to reefs off Kaneohe Bay and Sand Island (Oahu). Since 1965, a host of federal and state environmental laws and regulations have taken effect, slowing but not stopping the decline of coastal ecosystems from pollution, dredging and filling. Although some success stories and reversals have been reported (most recently for Kaneohe Bay which has showed a recovery of coral reefs after sewage discharges into the lagoon were terminated), recovery of many ecosystems from previous impact will be incomplete or slow.

Another serious problem is the persistent overfishing of coastal stocks for recreational and quasi-commercial purposes. It will be nearly impossible to effect reversal. The subsistence value of many fisheries has also been degraded by "outsiders" and overfishing pressure. Traditional forms of resource conservation have all but disappeared, and are no longer effective except in a few areas. Local authorities have been unable to manage fishery resources to maximize sustainable harvest, primarily a case of ever-increasing demand pressure against insufficient management, enforcement, and monitoring. Despite this poor record, state and commercial fishing interests are pressuring federal fish and wildlife agencies to open up fishing grounds in the National Wildlife Refuge encompassing the northwest islands. The prognosis for instilling an appropriate conservation ethic among the fishermen and authorities is not good. The Pacific territories can learn much from Hawaii about how and how not to manage and develop their important coastal resources.

MAP 1

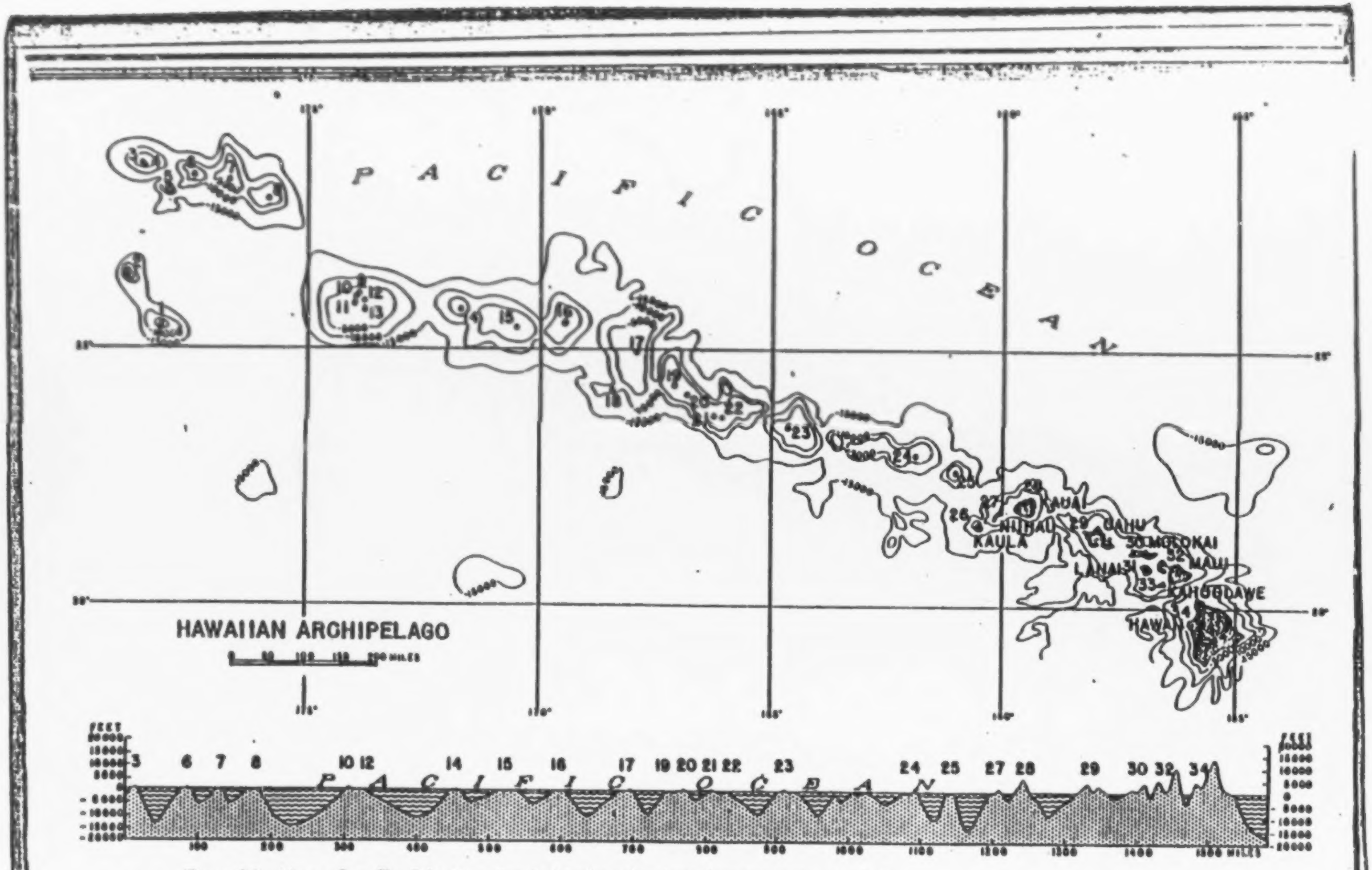
P A C I F I C O C E A N
HAWAIIAN ARCHIPELAGO
0 50 100 150 200 MILES
NIIHAU
KAUAI
KAULA
OAHU
MOLOKAI
MAUI
LANAI
KAHOOLAWE
HAWAII
FEET
MILES
3 6 7 8 10 12 14 15 16 17 19 20 21 22 23 24 25 27 28 29 30 32 34

Figure I.2—Map and profile of the Hawaiian Archipelago showing submarine contours in feet

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GUAM: PHYSIOGRAPHY

The Territory of Guam (13°28'N, 144°46'E0 is the largest and southernmost of the Mariana Islands and the easternmost U.S. territory. It is about 30 miles long and varies in width from 12 to 4 miles (Map 2). The non-reef land area is 212 square miles. There are 12 small limestone islands along the reef, the largest being Cocos Island off the southwest coast. The Marianas sit on the eastern edge of the Philippine Plate just west of the Mariana Trench.

The northern half of Guam is a broad, gently undulating limestone plateau bordered by steep cliffs. The plateau slopes southwestward from an elevation of 600 feet in the north to less than 100 feet at the island's narrow midsection. The north part of the plateau is too permeable to support permanent streams, but well developed sinkholes are numerous and the groundwater reservoir is significant. The northern plateau is bordered in places by a coastal plain of irregular width and three prominent peaks rise from it, two of which are volcanic.

The southern half of Guam is a broad, dissected upland mostly of volcanic rocks. The surface is weathered into peaks and basins with the latter deeply incised by streams. A nearly continuous mountain ridge parallels the west coast with several peaks over 1,000 feet in height. Two prominent limestone masses, Cabras Island and Orote Peninsula, jut oceanward (west) form the large plain at Apra Harbor. While the northern plateau is dominated by limestone forests, savannah and ravine forests cover much of the south.

Guam is bordered by fringing reefs of various widths. A triangular-shaped barrier reef encloses a shallow lagoon (Cocos Lagoon) at the southwest corner of the island. A submerged coral bank, barrier reef and Cabras Island enclose a deep lagoon at Apra Harbor. Reefs along the northeast coast of the island are not well developed.

History

The first inhabitants of Guam were probably settlers from the Philippine-Eastern Indonesia region of Southeast Asia before 1500 B.C. Two major cultural episodes (pre-Latte and Latte) probably characterized Guam's prehistory. The island was divided into chiefdoms, ruled by individual royal families. The early Chamorros developed an advanced fishing, horticultural and hunting society, with sporadic warfare among chiefdoms. Archaeological evidence suggests that population levels may have approached today's. In 1521, Ferdinand Magellan was the first Western explorer to set foot on Guam, and began 377 years of Spanish rule. Rapid colonization by Spanish conquistadores led to warfare, disease, expansion of Catholicism, port development at Umatac and military rule. The original Chamorro population rapidly declined, were resettled into a few villages, and a mixed Chamorro Mestizo culture emerged as Guam established trade with Mexico and the Philippines. Many new Latin customs and foods were introduced. Agriculture shifted from rice to maize production. Guam was ceded to the United States in 1898 after Spain's defeat in the Spanish-American War. A small American military garrison was established and ruled all aspects of civilian life in the territory. A U.S. Navy coaling station for ships was soon established at Apra Harbor.

The Japanese bombed Apra Harbor on December 8, 1941 and soon invaded Guam to defeat the small American garrison. Despite its brevity, the impact of the Japanese occupation was profound. With American reinvasion imminent, the Japanese fortified much of the island, destroyed many older structures, and used many of the Guamanians as indentured laborers. Prior to American invasion and recapture of Guam in July-August 1944, much of the island was heavily damaged by bombing. After 1944, military dredging and construction began, especially in Apra Harbor, and many razed and leveled villages were reconstructed. Military presence and development continued to increase in the post-war years, and the military presently controls one-third of the island's land area. The Organic Act of 1951 established civilian rule on the island. A Governor was appointed by the President of the United States, and a unicameral legislature was elected. Federal administrative control over the island passed from the U.S. Navy to the U.S. Department of Interior. Since 1970, the Governor has been elected. The advent of civilian rule opened markets and greatly stimulated the economic development of modern Guam.

Socioeconomics

Over half of the approximately 120,000 residents of Guam are of Chamorro Guamanian heritage. Caucasians (primarily military personnel and dependents), Filipinos and Carolinians (Micronesians) also contribute sizeably to the population. There are also small numbers of Hawaiians, Japanese, Koreans and Chinese. Throughout Guam's colonial history, the indigenous residents (Chamorros) have had to adapt to new and introduced lifestyles, but they still retain a body of traditional knowledge about island resources. Although full-time commercial and subsistence fishermen are fewer today than earlier, there are still many part-time "recreational" fishermen. Agriculture is concentrated in the south, but there is nothing like the plantation economy of Spanish colonial rule. Typhoons frequently damage crops, particularly fruits and vegetables. Increased irrigation water for crops is of primary importance to the island's future economic development and self-sufficiency. Guam lacks natural energy resources, and imports oil and coal. The population has grown rapidly since World War II and is the largest of the three U.S. flag territories. Agana continues to be the island's urban center; two dozen small villages are scattered throughout the island, especially along the coast. Standards of living, education, public health and public services have steadily improved and surpass those of any Pacific territory (though not Hawaii's). Today, military activities are centered around the Navy facilities at Apra Harbor and the Air Force facilities at Andersen Air Force Base. Future economic potential lies in tourism, diversified agriculture, expanded commercial fishing (especially for skipjack), and expanded retail and light industry. Over the past two decades, Guam's economy has grown steadily from tourism, retail trade, and continued high military expenditures. The past decade saw a major increase in foreign investments, especially from Japan for resort development: most of Guam's tourists are from Japan. Tourism is Guam's greatest income producer from the private sector, ranking only behind the military as a source of expenditures.

Important Coastal Resources

Guam's barrier and lagoon reefs are the most important of the island's coastal resources. Coral communities are highly diverse, but reef development is affected by frequent tropical storms. Sandy beaches are also highly valued for the visitor industry and recreation of local residents. Important mangrove stands are found only in Apra Harbor. Small but important beds of seagrass occur at Cocos Lagoon, Agana Bay, Nimitz Beach, Pago Bay and Togcha Bay. Stream-mouth estuaries are found off the Pago, Ylig, Togcha, Talofofo, Pauliluc, Inarahan, Agfayan, Cetti and Atantano Rivers. These, along with several small lakes (including Fena) and one large wetland at Agana, figure as important aquatic resources. Limestone and ravine forests are the most important terrestrial systems.

Coral reefs provide fishery resources, recreational swimming and diving opportunities, replenish white sand beach, and protect the coasts of Guam from typhoons. Rare, threatened and endangered species use Guam's ecosystems for habitat. These include forest, ground and wetland birds and marine turtles.

Resource Management Problems and Issues

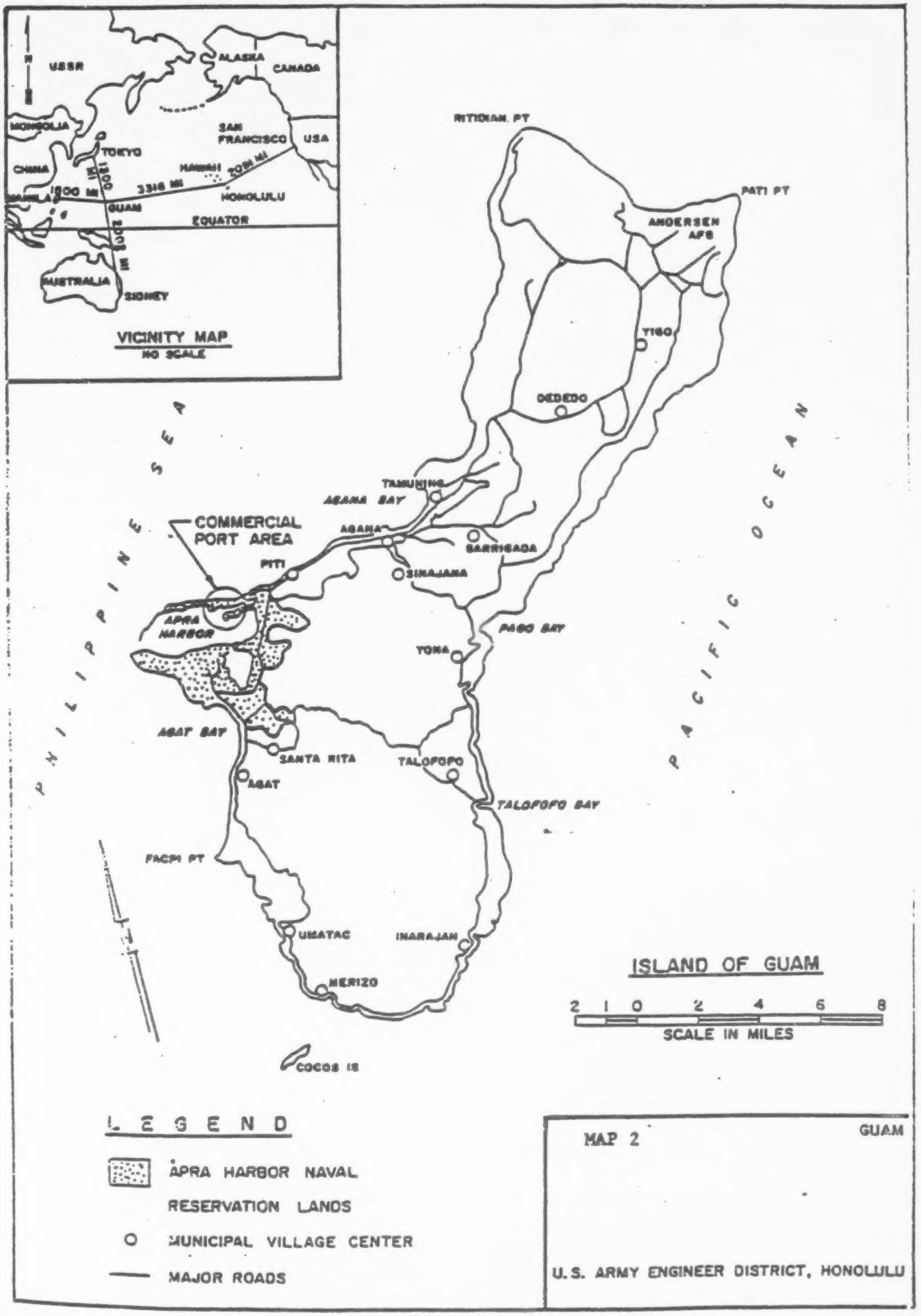
Military dredging and filling before, during and after World War II, as well as the war itself, adversely affected Guam's reefs and other coastal resources. Centuries of slash-and-burn agriculture and savannah range fires set to promote hunting opportunities have aggravated soil erosion and contributed sediment to rivers, estuaries and reefs. Municipal sewage is a problem in several areas (Agana, Apra). Thermal pollution from powerplant discharges near Cabras Island has been studied and monitored. Sewage treatment and outfall projects have, however, been initiated or are in the planning phase. In addition, EPA is sponsoring projects in wastewater management and drinking water quality to eliminate remaining water pollution impacts, except those related to non-point sources from soil erosion.

Recently, major dredging in Tumon Bay and Agana Bay has been proposed to promote tourism opportunities. Some dredging proposals could have a significant and avoidable adverse impact. Several U.S. environmental laws that have been applied quite successfully to control development impacts on coastal resources also apply to these proposals (Clean Water Act, Coastal Zone Management Act, River and Harbor Act, Endangered Species Act, National Historic Preservation Act). The U.S. Army Corps permit process should be able to impose adequate controls over construction, design, magnitude and siting. These same environmental laws apply to Hawaii but were enacted too late there to avoid substantial adverse environmental impacts.

The local government's strong support of this permit program and of coastal resource management programs, as well as the active involvement of coastal resource scientists at the University of Guam, have contributed to conservation of Guam's coastal resources. Small craft harbors have been proposed at several locations (Merizo, Agat, Pago, Ylig) to supplement the small harbor at Agana. Improvements to the proposed deep draft commercial port at Apra are in the planning stage. There appears to be adequate environmental planning and control over these projects. The Navy is about to move its ammunition pier from Apra to Adogan (near Orote) Point off the mouth of Apra Harbor. This will free Apra Harbor for unlimited commercial use, but could significantly degrade coral reefs at Adogan unless the Navy follows through on commitments to control construction impacts and to establish and manage two ecological reserves (including one at Orote).

Major challenges in the future will be to stem soil erosion; expand safe drinking water supplies; and develop more effective programs for the disposal of solid wastes and hazardous wastes (including unexploded ordnance). The probable application on Guam of the new Defense Environmental Restoration Account (administered by the Corps) should help in the latter effort.

Future resort and military construction on the island will require close scrutiny and control. Protection and recovery of several declining bird, marine turtle, and marine mammal species residing or visiting Guam will also be important. In the legislative area, additional programs in (1) solid waste management and cleanup, (2) drinking water quality and supply, and (3) small and deep draft navigation (including adequate environmental controls) will be important to the future economic development and conservation of coastal resources of Guam. Resort growth management and control of soil erosion will be primarily the concern and responsibility of the local government.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GUAM
EQUATOR
AUSTRALIA
SIDNEY
VICINITY MAP
NO SCALE
RITIDIAN PT
PATI PT
ANDERSEN AFB
YIGO
DEDEDO
TAMUNING
AGANA BAY
AGANA
BARRIGADA
SINAJANA
COMMERCIAL PORT AREA
PITI
APRA HARBOR
PAGO BAY
YONA
PHILIPPINE SEA
PACIFIC OCEAN
AGAT BAY
SANTA RITA
TALOFOFO
AGAT
TALOFOFO BAY
FACPI PT
UMATAC
INARAJAN
MERIZO
COCOS IS
2 1 0 2 4 6 8
SCALE IN MILES

ISLAND OF GUAM

LEGEND

▨ APRA HARBOR NAVAL RESERVATION LANDS

○ MUNICIPAL VILLAGE CENTER

— MAJOR ROADS

MAP 2

GUAM

U.S. ARMY ENGINEER DISTRICT, HONOLULU

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NORTHERN MARIANA ISLANDS: PHYSIOGRAPHY

The Commonwealth of the Northern Mariana Islands comprise all of the Mariana Islands except Guam, and consists of 16 islands (three of which form the "island" of Maug) located between latitudes 14'N and 20.5'N and between longitudes 145'E and 146'E (Map 3). The total land area of the Commonwealth is 184 square miles. Large permanent human populations are found only on the three largest islands in the south: Saipan, Tinian and Rota. Smaller settlements occur on several of the northern islands: Agrihan, Pagan, Alamagan, and Anatahan. Farallon de Medinilla is occasionally used for bombing practice. The small settlement on Pagan was recently evacuated, perhaps permanently, when its volcano erupted. The remaining islands in the chain are uninhabited and have been subject to very little scientific study.

The Marianas sit atop a submerged volcanic mountain range of Eocene age, the result of tectonic forces associated with the Pacific plate's collision with (subduction beneath) the Philippine plate (Map 3). Geologically, the islands fall into two regions, the first being a younger chain of small purely volcanic islands extending north from the submerged volcano Esmeralda and Anatahan Island. The islands of Guguan, Pagan, Agrihan, Asuncion, and Farallon de Pajaros belong to this group and are either active volcanoes or have been so during the 20th century. The second group includes Saipan and the three islands to the south of it (Guam comprises the fifth island in this southern group). Saipan, Tinian, Rota and Aguijan are volcanic in base, coral-capped, and show evidence of more prolonged evolution (Maps 4-6). Barrier reefs and well-developed fringing reefs tend to develop along the western coasts of the southern islands while the eastern shorelines are generally rocky and cliffbound.

Saipan, Tinian, Rota, Aguijan and Farallon de Medinilla have four principal types of shoreline: rocky shorelines; beaches; low-lying shorelines; and man-made or altered shorelines. A few mangroves are found along the coast of Saipan. The entire shorelines of Aguijan, Farallon de Medinilla, and of most smaller northern islands are bordered by steep rocky slopes and sea cliffs. Coral reefs are absent. Rota, Tinian and Saipan have both steep and low-lying shorelines. Their beaches are bordered by fringing reefs or erosional benches of various widths and origins. Some of the fringing reef platforms are erosional features while others are accreted from the growth of corals, calcareous algae and other reef organisms. Offshore barrier reefs with shallow lagoons have developed along parts of the western coasts of Saipan and Tinian.

Saipan (47 square miles) is the largest and most populous island in the Commonwealth. The northern three-fourths of the island is upland, dissected by low saddles which provide access from one side of the island to the other. The highest peak is Mount Tagpochau in mid-island (1,555 feet).

Rota, the second largest and next most populous island, is 79 miles south-southwest of Saipan and 44 miles north-northeast of Guam. It is 11.5 miles long (east to west) and 3 miles wide and has a land area of 33 square miles (18 percent of the total for the Commonwealth). There are well-developed reefs along the northwest coast which straddle both sides of Taipingot Peninsula. The third largest and most populous island in the Commonwealth is Tinian, which is located between Saipan and Rota.

History

The history of the Northern Marianas parallels that of Guam. Initial settlement was probably by peoples originating from the Philippine-Eastern Indonesian islands at around 1500 B.C. or earlier. Both pre-Latte and Latte cultures flourished. The oldest date recorded from archaeological studies (1527 B.C. and +/-200 years) was from the Chalan Piao area of Saipan, but is not yet corroborated elsewhere. The early northern Mariana peoples were noted for their sophisticated pelagic sailing, fishing, and possibly aquacultural and horticultural technologies. Fernan de Magalhaes (Magellan) was the first European to see the Mariana Islands on March 6, 1521 but probably visited only Guam. The first recorded landing occured on Saipan in 1564 when Miguel Lopez de Logaspi proclaimed Spanish sovereignty over the Marianas. Spanish occupation lasted more than 300 years and as on Guam greatly influenced the language, habits, religious beliefs and racial composition of the indigenous Chamorro islanders. Following the end of warfare on Guam, the Spanish military undertook punitive actions against rebellious natives. Diseases, famine and mass evacuations drastically reduced the Chamorros (from between 70,000 and 100,000 in 1668 to fewer than 4,000 in 1710). All islands north of Saipan (the Gani) were depopulated by the Spanish to Saipan in the 1690s, and Saipan and Tinian were depopulated to Guam and Rota by the 1720s. By 1760, fewer than 2,000 Chamorros remained. After 1800, a mixed blood population steadily grew. Virtually no pure-blooded Chamorros remain, except perhaps on Rota. The Chamorro have mixed primarily with Spanish, Carolinian, Japanese, German, Korean, Okinawan and American peoples.

After the Spanish-American War in 1898, Germany purchased the Marianas, expanded their copra industry, encouraged rancing and farming, and established schools. Japan seized the Marianas from Germany in 1914 and the Japanese mandate over the islands was approved in 1920 by the League of Nations. The Japanese interest was initially strategic and military, but later focused on colonial expansion and use of the islands as a permanent settlement for surplus Japanese nationals. Saipan was designated the headquarters for the islands, and by 1930 over 20,000 Japanese lived there. Before World War II, the population of the island peaked at 45,000. Sugar cane and rice farming, phosphate and manganese mining, and inter-island trade flourished during this period. Pelagic fish catch approached five million pounds. All land not owned at the time of Japanese occupation became inaccessible to the Saipanese, and many parcels were confiscated without compensation. Some locals were used as slave laborers and were not allowed access to their own lands and food supplies. Because the local labor force was small, Korean and Okinawan laborers and farmers were brought in by Japan. The Japanese influence increased as Japanese language schools were established with attendance mandatory. However, social and religious practices were respected.

World War II devastated Saipan. The Japanese heavily fortified the island during the latter half of the war, and it was heavily bombarded prior to the American invasion in June 1944. Japanese casualties were heavy, and after bitter fighting, the islands were secured by the Americans. All Japanese were soon deported from the islands and returned to Japan. Litter from the battles and occupation is still strewn over undeveloped portions of Saipan, and unexploded ordnance is abundant. During the U.S. Naval administration, Chalan Kanoa developed into an attractive, commercial diverse town. Japanese veterans and their relatives, archaeologists, and historians frequently visit Saipan to pay respects and search for remains. Numerous monuments erected by the Japanese, battlegrounds, and relict armament are significant historical resources.

Rota is the only island of the Northern Marianas with a history of continuous Chamorro occupancy, but like Saipan, it has had a long succession of foreign rulers beginning with the Spanish in the 17th century. During the brief German occupation, copra and cattle production and phosphate mining were initiated and sugar cane was heavily and successfully developed during Japanese rule. Although no World War II battles were actually fought on Rota, bombing destroyed all commercial facilities and the main village of Songsong, shattered the island's economy, and reduced its population significantly. The Japanese cultivated about 90 percent of Tinian into sugar cane in the 1920s-1930s including all flat land. The only native vegetation remaining is on steep slopes and interior cliff lines.

After the war, the Northern Marianas became one of the districts of the TTPI administered by the United States under United Nations mandate. The capital of the TTPI was established on Saipan. In 1976, the people voted for U.S. Commonwealth status and a de facto government, the Commonwealth of the Northern Mariana Islands, was established. "Officially" Commonwealth status will not be recognized until the TTPI is terminated by the United Nations.

Socioeconomics

The 1980 census revealed a population of 17,000 on the Northern Marianas, 86 percent of which (14,585) resided on Saipan. Over 45 percent of the Saipan population resides within the Susupe-Chalan Kanoa village area. San Jose is the island's other large village. Approximately 1,500 people resided on Rota in 1980; fewer than 1,000 on Tinian. Presently, the population is growing rapidly. On Rota, the annual increase is estimated at 7 percent. By 1990, the population of the Northern Marianas is projected to approach 35,000, with 30,000 on Saipan. Land ownership in the Commonwealth is tied to family solidarity and considered an inherent family resource. As need arises, new dwellings are constructed on family plots. Urban renewal of substandard housing is an important government program on Saipan.

Tourism is seen as central to Saipan's economy, but accurate information on tourism revenues is lacking. Expansion of the fishing fleet and catch is also a main objective of economic development, and recently foreign investment has increased substantially in both of these sectors (especially fishing vessels, expansion of markets, etc.). A great majority of the over-60,000 tourists visiting Saipan annually are Japanese. Improvements to the shallow water harbors and deep water commercial ports at Saipan are in the planning stages. In any case, government programs and employment will continue to contribute significantly to the economy.

The bombing of Rota during the war denuded much agricultural land, and except for grazing, these lands still remain idle. Subsistence farming is presently the main agricultural activity. Low population, residual damage from the war, the high cost of land clearing, and the lack of reliable and cost-effective transportation to Guam and Saipan markets are cited as factors discouraging agricultural development. The lack of cooperation from the Governor of Guam on acceptance of CNMI produce has discouraged agricultural development between the two areas. Guam, having the same climate as Saipan, incurs the same market problems experienced by Saipan during the peak season. Future potential lies with fruit and vegetable exports to Saipan, Guam and

Japan, and the growth of the beef cattle industry. Two modern hotels were recently completed on Rota to service the growing tourist industry, with expansion a goal of the local government. The Rota runway was recently lengthened and resurfaced to handle larger jet aircraft from Japan. Recent completion of Rota's first commercial harbor facilities should stimulate trade.

The economic future of Tinian is less clear. The U.S. Department of Defense has an option on considerable island acreage for future military use and possible development. The island has one commercial port on the west coast, and there are plans to increase harbor facilities for fishing and other purposes.

Important Coastal Resources

The coastal resources of the Northern Marianas are linked biologically to those of Guam and are strongly influenced by volcanism and by frequent tropical storms and typhoons. Living coral communities are found along most shorelines of the larger (and older) southern islands, but well-developed growing reefs are generally confined to the west coasts. White sand beaches occur landward of many protected reef tracts. Several important and large wetlands are found on Saipan and Tinian. Streams and estuaries are poorly developed or absent. Seagrass beds are rare and mangroves almost absent.

Saipan's most important freshwater coastal wetlands are Lake Susupe and the swamp at Garapan, both of which serve as habitat for endangered water birds. Other significant wetlands occur at Sadog Tase, Lower Base, and Tanapag. Important coral reefs include the complex barrier reef formations along the entire west coast; and smaller fringing and apron reefs at Bahia Fanunchuluyan, Unai Laulau Katan, and Bahia Laulau along the east coast, and at Unai Obyan and Unai Dangkulo Agingan along the south coast. Seagrass beds are well developed only on the lagoon reefs offshore from the urban centers at Chalan Kanoa and Garapan and at Tanapag. Smaller beds occur off Unai Matuis and U. Papau. Several pinnacle and patch reefs, unique to the Commonwealth, are situated in the Garapan lagoon area. Minor mangrove stands exist at Unai I Hasngot, and at Delta Dock within the commercial harbor area at Tanapag.

Coral reefs are less developed at Tinian. Narrow fringing reefs occur at Unai Dangkulo along the east coast; smaller lagoon fringing and apron reefs at Lamanibot, Peipeinigual, and Tinian Harbor along the west coast. There is a single patch reef in the harbor. A few small seagrass beds also occur at Tinian Harbor, Unai Chiget (east coast). Significant wetlands include the large lake at Hagoi, and the small pond at Magpo.

Important coastal resources on Rota include the narrow fringing reef along most of the northwest coast and narrower fringing reefs off Sasanhaya and both sides of Puntan Malilog along the south coast. Several intermittent streams occur along the south coast east of the Puntan Poniya, but usually do not run long enough to reach the ocean. Mangrove have not been reported, and only a single small bed of seagrass is reported in the vicinity of West Dock.

Aguijan's coastlines have been surveyed. The dominant features are rocky beaches and sea cliffs. Although structural reefs (including flats) are absent, coral communities are diverse, and active reef development is evident at many places. The shoreline of Farallon de Medinilla has also been surveyed and consists entirely of rocky shorelines; reef development is unknown. Two important wetlands, a freshwater lake and saltwater lake, were reported from Pagan Island, but their status since the recent volcanism is unknown. Although coastal ecosystems are poorly developed along the northern younger islands, the terrestrial communities contain rare species of plants and birds, and several islands (including Pagan and Maug) have been proposed for reserve status.

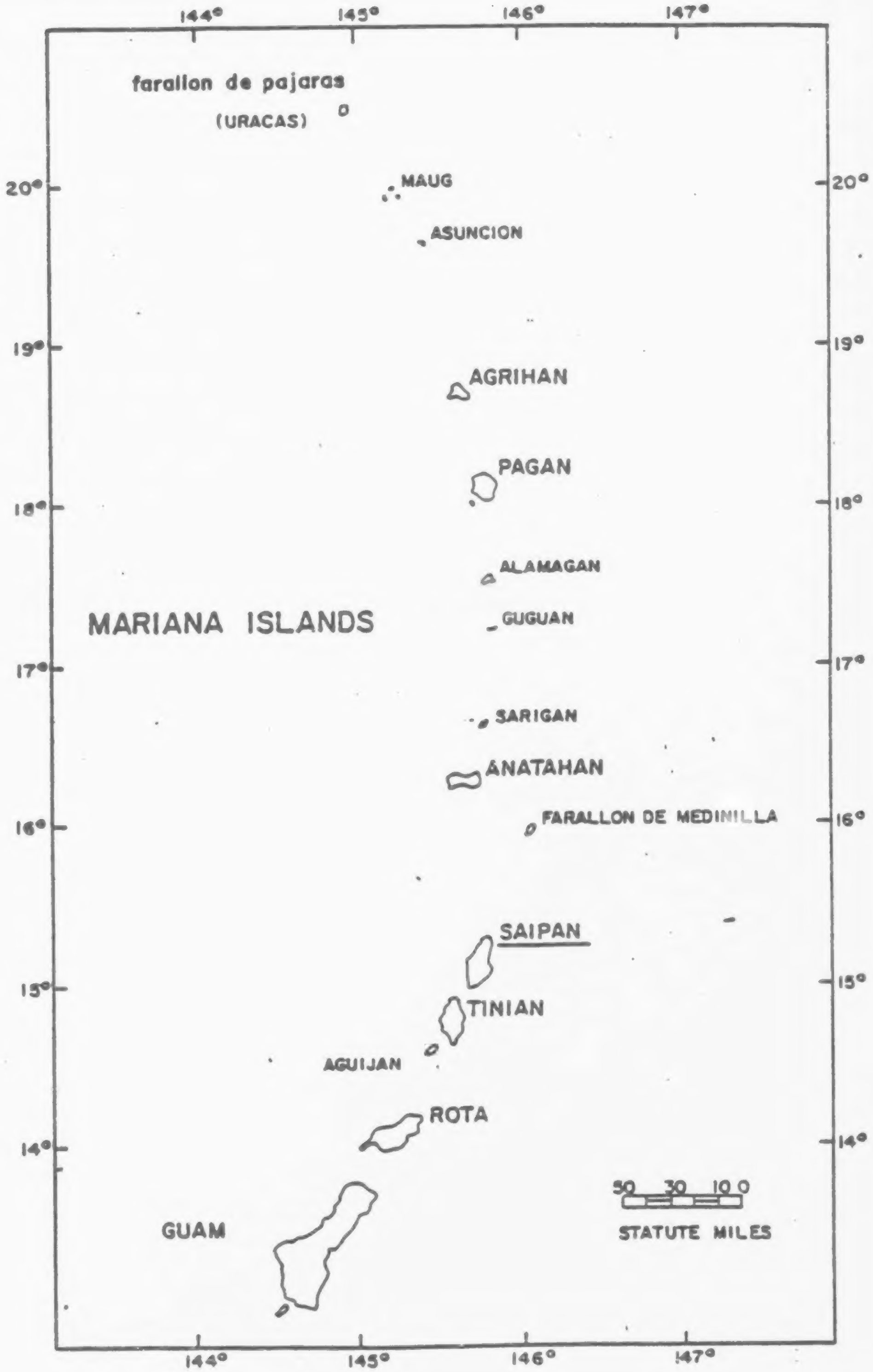
Management Problems

World War II and associated military dredging and filling probably had major impacts on coastal environments in the Northern Marianas although little of this has been documented. Since the war there has been little military-related construction. Perhaps the most critical problem facing the Commonwealth today is uncontrolled and haphazard urban growth. Although the Commonwealth has a well-organized coastal resources management (CRM) program and regulatory process, comprehensive land use planning and controls are lacking In essence, the CRM office is serving as the Commonwealth's development planning office, an important responsibility justifying additional funds and staff. Important ecosystems, including reefs, lagoons, offshore islands, and Lake Susupe on Saipan have been afforded protective status under CRM, but lack of enforcement could still threaten resources. Overseas investors are allegedly trying to interest the Commonwealth government in privately-funded projects to dredge and fill selected coral reefs for resort development. In return for granting fee title to investors, the government would receive enhanced revenues and economic development would be stimulated. Four separate resort projects are in progress, including expansion of three hotels and construction of an additional hotel. Clearly, there is an urgent need for systematic evaluation and planning for future resorts to minimize adverse cultural and environmental impacts. Controls or guidelines over foreign investment also seem warranted.

Other environmental issues facing the Commonwealth today are management of solid waste, including refuse; groundwater quality and supply; wastewater management; and resort growth management. Controls over future military development of Tinian and harbor construction will also be important.

There is a clear need to have organized and centralized collection and disposal of solid wastes on Saipan where accumulating refuse is unsightly and hazardous. There has been indiscriminate disposal in coastal waters. Cleanup of war debris and unexploded ordnance is also necesary to prevent accidents and unauthorized use of explosives for fishing. Adequate groundwater quality and quantity will be major constraints to future economic development. Flood control and urban renewal is also needed in Susupe-Chalan Kanoa. Although EPA is constructing adequate outfalls and treatment facilities for domestic sewage on the islands, funds are inadequate for hookups to individual houses. Thus, sewage pollution remains a serious problem.

MAP 3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SARIGAN
ANATAHAN
FARALLON DE MEDINILLA
SAIPAN
TINIAN
AGUIJAN
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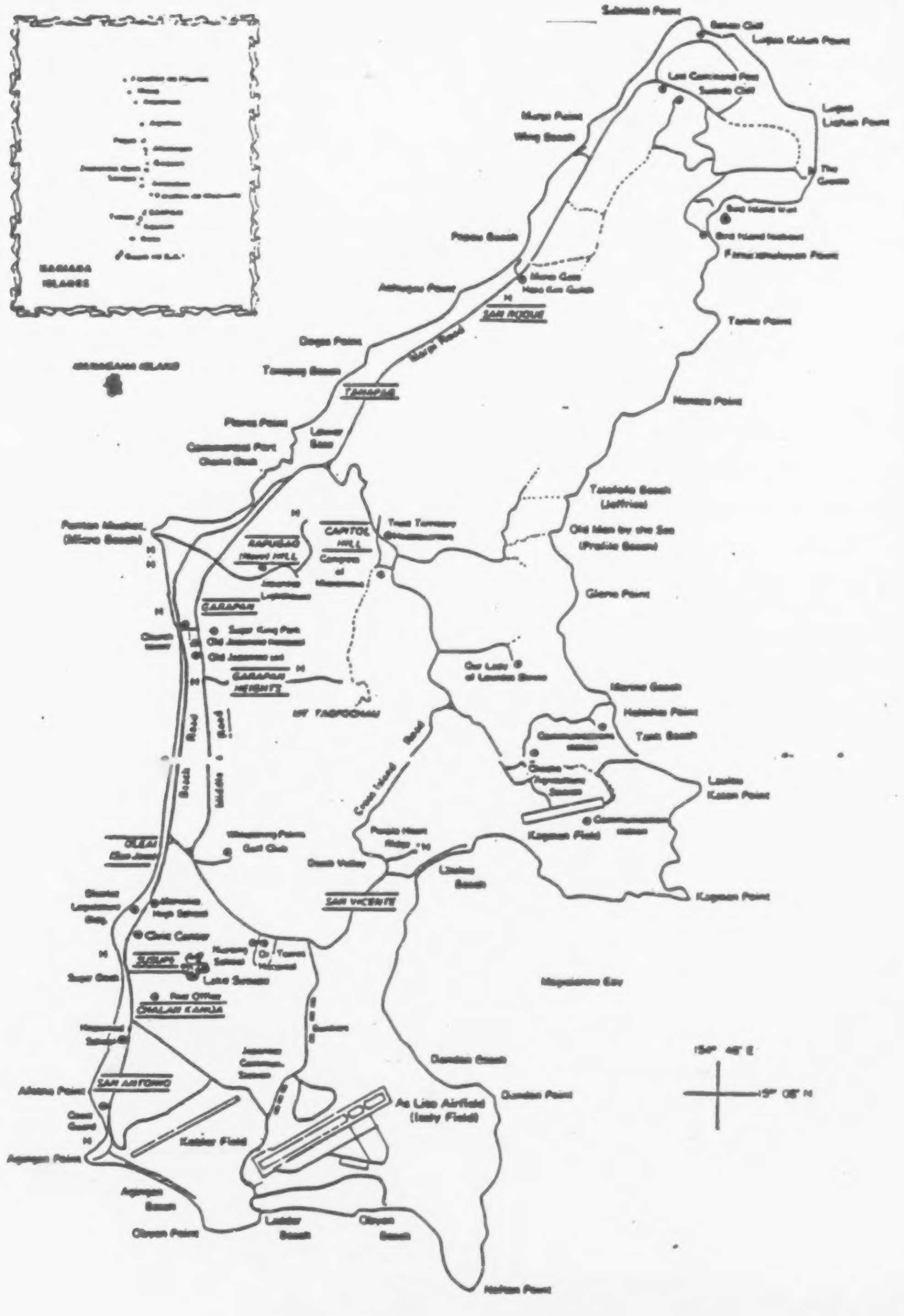
STATUTE MILES

MARIANA ISLANDS DISTRICT

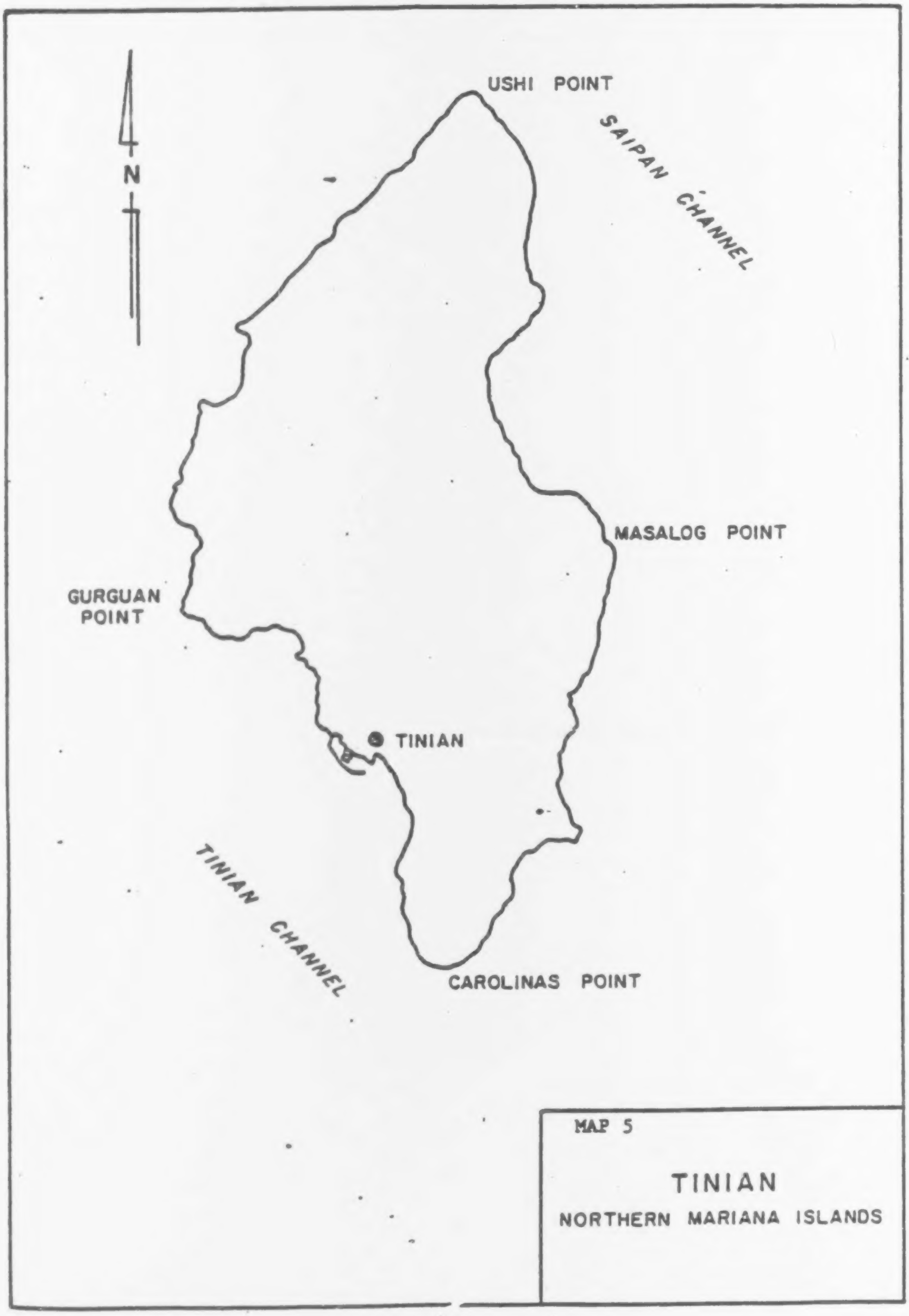

MARIANA ISLANDS
Mariana Island
Submarine Point
Banzai Cliff
Lujan Kalum Point
Last Command Post
Suicide Cliff
Marpi Point
Wing Beach
Lujan Lujhan Point
The Grotto
Bird Island trail
Bird Island lookout
Papago Beach
Marpi Cave
Achugao Point
San Roque
Tanke Point
Dogpo Point
Marpi Road
Tanapag Beach
Tanapag
Flores Point
Lower Base
Commercial Port
Charlie Dock
Puntan Muchot
(Micro Beach)
Rapugao (Navy) Hill
Capitol Hill
Congress of Micronesia
Trust Territory Headquarters
Talofofo Beach
(Jeffries)
Old Man by the Sea
(Profile Beach)
Garapan
Sugar King Park
Old Japanese hospital
Old Japanese jail
Garapan Heights
Mt Tapochau
Our Lady of Lourdes Shrine
Marine Beach
Hatsuha Point
Tank Beach
Communications station
Kagman Field
Laulau Kattan Point
Kagman Point
Beach Road
Middle Road
Cross Island Road
Oleai
(San Jose)
Golf Club
Death Valley
Laulau Beach
San Vicente
Marianas High School
Civic Center
Susupe
Nursery School
Lake Susupe
Post Office
Chalan Kanoa
Magicienne Bay
San Antonio
Japanese Cemetery
Afetna Point
Coast Guard
Kobler Field
As Lito Airfield
(Isely Field)
Dandan Beach
Dandan Point
Agingan Point
Agingan Beach
Obyan Point
Ladder Beach
Obyan Beach
Naftan Point
154° 46' E
15° 08' N
Road
Jeep or foot trail
Hotel

MAP 4

SAIPAN

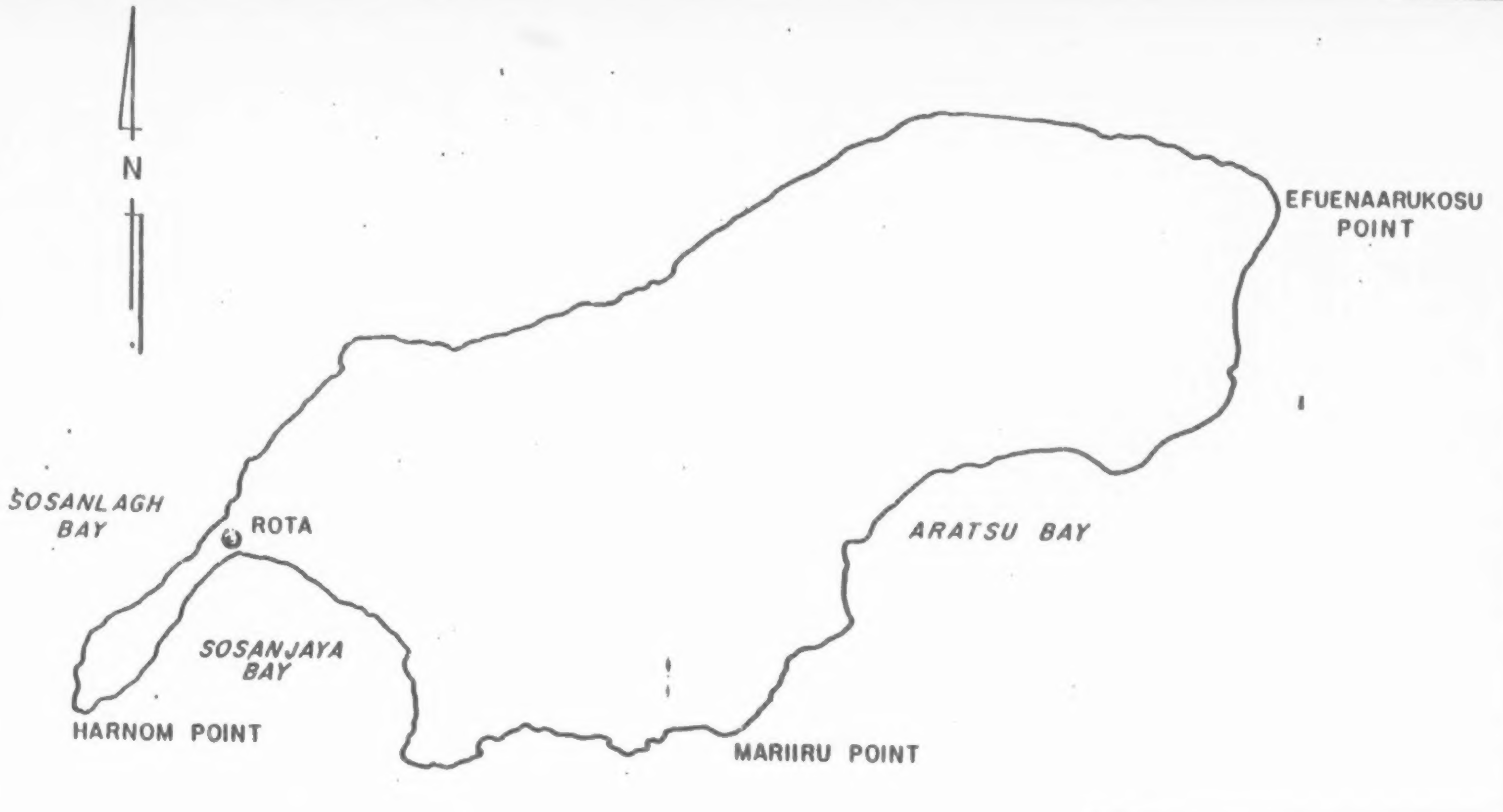
Map by Nicolas C. Guerrero and Mike Ashman

84


N
USHI POINT
SAIPAN CHANNEL
MASALOG POINT
GURGUAN POINT
TINIAN
TINIAN CHANNEL
CAROLINAS POINT

MAP 5

TINIAN
NORTHERN MARIANA ISLANDS


N
SOSANLAGH BAY
ROTA
SOSANJAYA BAY
HARNOM POINT
MARIIRU POINT
ARATSU BAY
EFUENAARUKOSU POINT

MAP 6

ROTA

NORTHERN MARIANA ISLANDS

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AMERICAN SAMOA: PHYSIOGRAPHY

American Samoa (Map 7) consists of the eastern half of the Samoa archipelago which is centered at 14'S latitude and 170'W longitude. Samoa is approximately 2,200 miles southwest of Honolulu, 2,500 miles northwest of Sydney, and 3,500 miles southeast of Guam. The archipelago stretches some 600 miles northwest to southeast immediately north of the Tonga deep sea trench. The islands are progressively younger and larger to the northwest (Western Samoa) and smaller and older to the southeast (American Samoa). Rose atoll is the easternmost and oldest island of American Samoa, which also includes the main island of Tutuila (54 square miles); the Manu'a islands of Tau, Olosega and Ofu; Aunuu Island off the southeast coast of Tutuila, and a northerly outlier, Swains Island. Total land area of the territory is 76 square miles. Except for Swains and Rose atolls, all the islands are volcanic basalt; the volcanic islands are typically steep-sided with little coastal plain and lushly vegetated. Relatively narrow fringing reefs occur along most shorelines. Rose Atoll is an uninhabited National Wildlife Refuge, and Swains consists of a private copra plantation with mainly Tokelau workers.

American Samoa has the smallest land area of the U.S. Pacific territories; in population (35,000 in 1980), it exceeds only the Commonwealth of the Northern Mariana Islands. All of the islands are inhabited, the Manu'a group most sparsely.

The territory's major physiographic feature is Pago Pago Harbor which nearly bisects Tutuila in its center. The large v-shaped inner harbor serves as a chief port of call in the South Pacific, and Pago Pago is the main urban center in the territory. Tutuila is about 20 miles long east to west and varies in width from 1 to 6 miles. Topographically it is a narrow, irregular volcanic ridge rising steeply from the ocean. Its numerous peaks range in elevation between 1,000 and 2,141 feet (the peak of Matafao). The Manu'a islands are also rugged. Tau is rectangular, 8 miles long and an average of 4 miles wide. It is very steep and claims the highest elevation in the Territory (nearly 4,000 feet). Ofu and Olosega are both triangular pyramids of 3 and 2 square miles, respectively. The two islinds nearly join at one point forming a narrow strait which was recently bridged.

History

Archaeological evidence suggests initial settlement in Samoa occurred before 1000 B.C., probably from eastern Melanesia. The settlers were among the first Polynesians who later ventured from Tonga or Samoa to the Society and Marquesas islands from which the rest of the Polynesian islands were settled. Samoan prehistory can be delineated into two major cultural sequences: ceramic (1000B.C.-200A.D.) and aceramic (A.D.200-1830). Samoan subsistence economy was geared to intensive horticulture (especially taro and breadfruit) and marine exploitation.

Unlike the other flag territories and states in the U.S. Pacific, Samoans were christianized but never truly colonized, subjugated or decimated by foreigners, disease and warfare. Samoa was discovered by Dutch navigators in the 1700s. At that time, Samoa was not divided into what is now American Samoa and Western Samoa (Upolu and Savai'i). Nucleated planned village settlements emerged from more dispersed settlements after the arrival of traders and missionaries in 1830.

Although the islands remained unclaimed, they were the object of great power struggles until 1899, when treaty negotiations among the United States, Germany and Great Britain gave the eastern Samoan islands to the United States and Western Samoa to Germany. In 1925, the U.S. annexed Swains Atoll (225 miles north of Tutuila) which is no longer claimed by Tokelau. New Zealand gained control of Western Samoa after Germany's defeat in World War I, and independence came in 1962. From 1900 to 1951, the U.S. Navy administered American Samoa. In 1951, administration was transferred to the U.S. Department of the Interior. American Samoa was spared from battle during World War II, but the U.S. constructed many fortifications during that time. American Samoa today remains an unincorporated territory of the United States.

Socioeconomics

Under America Samoa's traditional system of land tenure, the land is held by extended families (aigas) and managed by chiefs determined through kin relationship. The claims of each aiga are recognized and respected by every other aiga, and land is rarely transferred. The U.S. has made an effort to preserve this system, and today over 92 percent of all land is still communally owned. Less than one percent is available for sale, and then only to those with 50 percent or more Samoan blood. The remaining 7 percent is held by the American Samoa government (primarily in the Pago Pago Harbor area) or churches.

For thousands of years, Samoans grew, hunted or fished all the food they needed. Traditional horticulture remains the subsistence activity, with about 2,400 acres now in cultivation for taro, breadfruit, coconut, banana, pineapple and papaya. Crops are grown communally-owned plantations, and most produce is consumed by the families themselves. Limited amounts reach and Marquesas islands from which the rest of the Polynesian islands were settled. Samoan prehistory can be delineated into two major cultural sequences: ceramic (1000B.C.-200A.D.) and aceramic (A.D.200-1830). Samoan subsistence economy was geared to intensive horticulture (especially taro and breadfruit) and marine exploitation.

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American Samoa's slow shift from a traditional subsistence economy toward a western cash economy has resulted in a drop in agricultural activity, improved living standards and housing, but increased economic dependence on the U.S. for imported goods and services. The government is the Territory's largest employer, followed by Pago Pago Harbor's two large tuna canneries. The government has begun programs to increase fisheries, tourism and labor-intensive light industries.

Important Coastal Resources

The importance of coastal resources has been recognized by the government and the villages for many centuries. Coral reefs provide sustenance, protection, recreation and navigation. Coastal streams are used for fishing and water supply; some coastal wetlands for agriculture; and sandy beaches for recreation and visitors. Offshore islands serve as refuges for fish and wildlife.

All coral reefs are the fringing type except for the unique barrier-like reef and lagoon system at Pala Lagoon. Essentially, the most significant reef resources are those near villages. The American Samoa Coral Reef Inventory catalogues and describes the various important functions and uses of reef resources in the Territory. The most important reefs occur in: Pago Pago Harbor, Utulei, Aua, Faga'alu, Tafananai, Alea, Faga'itua, Aoa, Masefau, Afono, Vatia, Fagasa, Massacre, Maloata, Poloa, Amanave, Nua Se'etaga and Leone, Asili, Pala Lagoon, and Matuu on Tutuila Island; Aunu'u on Aunu'u Island; Faleasao, Si'ufaga, Saua, and Fusi on Ta'u Island; Asaga Strait, Alafau, Ofu on Ofu Island; and Tamatupu Pouono, and Sili on Olosega Island. Structurally, the most important reefs occur at Pala Lagoon, Faleapoi Point, outer Pago Pago Harbor, and Faga'itua Bay on the south coast of Tutuila; and at Aoa, Masefau, Fagasa and Poloa Bays on the north coast. The government's coastal zone management program has also identified Pago Pago Bay and Pala Lagoon as areas of particular concern (and importance), and Fagatele Bay is presently being designated as a National Marine Sanctuary. Much of the north coast lacks structural reefs. Important structural reefs (Taema and Natanva) occur as offshore banks south of Tutuila; near Asaga Strait and Tu'umuai Point off Ofu; and at Puuono Point off Olosega Island. Most reefs in American Samoa are fringing reefs. Small patch reefs occur around Tutuila, and Rose consists of an atoll barrier reef enclosing a lagoon with patch reefs. The present designation of Rose as a National Wildlife Refuge administered by the U.S. Fish and Wildlife Service seems appropriate. The private ownership of Swains limits governmental jurisdiction.

Several important coastal wetlands occur in American Samoa: the mangrove forest in Pala Lagoon (the only large one in the Territory); the two marshes near Alao, Tutuila; the large marsh at Vatia, Tutuila, and lagoons at Leone and Pala on Tutuila; the two very large and important marshes on Aunu'u; the large coastal marsh at Tau Village on Ta'u; and the small marsh (Vaoto) near Papaloloa Point on Ofu Island. Small mangrove forests occur on Aunuu Island and Masefau Bay. Some two dozen streams on Tutuila are important for village water supply, estuarine maintenance, and freshwater fish and shellfish.

Management Problems

The Territory was spared military and related destruction during World War II, but urban development and the advent of western technology have had important impacts. Rapid population growth and encroachment of urban centers into agricultural lands have increased reliance on steep mountainous slopes where soil fertility is lower and potential for erosion greater. Siltation from urban and agricultural development was implicated in the decline of coral reefs in Pago Pago Bay in the 1920s and again in the 1980s. Recent road and trail construction to interconnect villages has surely caused siltation of other reefs, but this is only poorly documented.

Samoans have mined or collected beach sand for personal use for centuries, but some beaches are now being depleted by commercial construction. Reefs and beaches are traditionally under village control; dredging and filling has not been significant outside of Pago Pago Bay. The government has filled reefs in inner Pago Pago Harbor to expand its land holdings. Reefs off Nu'uuli, Fagaitua, and Alofau were dredged to supply fill for road construction.

Perhaps the single most significant impact to coral reefs in the Teritory came with the commercial airfield extension into Pala Lagoon. Considerable dredging, filling and quarrying of important reefs at Pala severely restricted tidal circulation; modified communities inside the lagoon; and possibly aggravated beach erosion along Coconut Point shoreline. Small boat harbor dredging and construction on Aunu'u, Ofu, Fusi (Ta'u), and Au'asi on Tutuila has probably somewhat damaged reefs but also created fish and coral habitat.

Bridge construction between Ofu and Olosega Islands also resulted in localized damage to reefs at Asaga Strait. However, the government and villages seem earnest about limiting such activities in the future under the territory's coastal management program.

For a long time, dynamite fishing on coral reefs was a serious problem in American Samoa. However, once village leaders were educated about its destructive effects, the practice was reduced somewhat, at least on reefs near villages. However, dynamite fishing and fishing with illegal poisons (usually laundry bleach) continue to be problems in American Samoa.

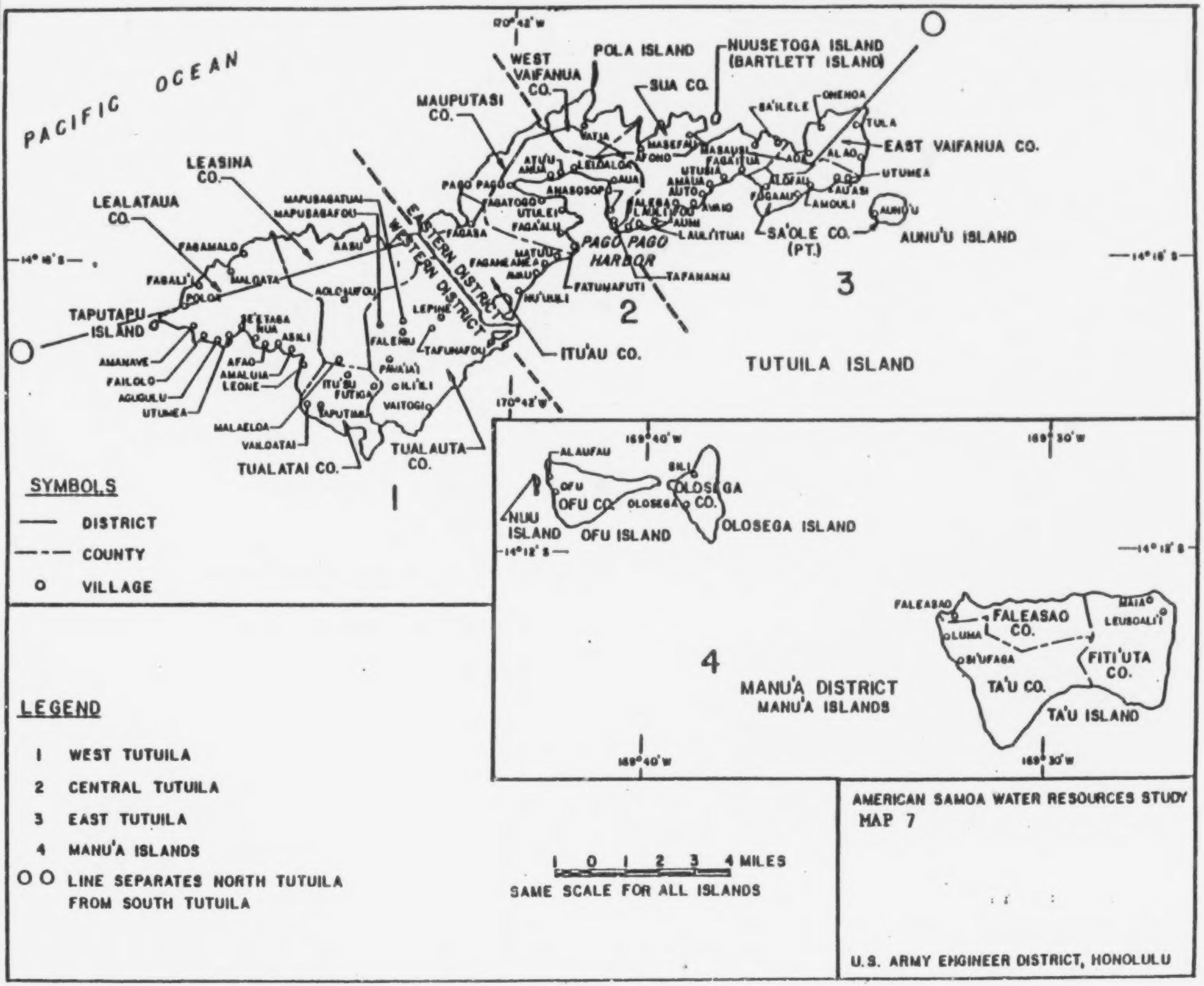
Sewage, oil and cannery waste pollution has long been a serious problem in Pago Pago Harbor. Sewage treatment plants at Utulei and elsewhere have largely eliminated degradation from domestic waste; oil handling and storage facilities have been improved, but the unauthorized dumping of bilge waters in the bay continues to be a problem. At present, there are no pumpout facilities for ships or yachts entering the bay.

Solutions to some of these problems are forthcoming. Tuna process sludge used to be dumped in open pits on the island (near Futiga) but EPA has now authorized deep ocean disposal of the sludge. Effluent treatment and disposal facilities are planned.

The cutting of mangroves and illegal filling of marshland is a continuing problem in American Samoa. Dredging and filling in coastal waters in American Samoa requires permits from the U.S. Army Corps of Engineers. Several government representatives recently complained about the U.S. Army Corps of Engineers' issuance of permits for dredging projects without prior review or approval by the local government. They urged consultation with the territorial Environmental Council and Coastal Zone Management Office prior to issuance of any permit.

Providing safe drinking water will continue to be an important problem, particularly as septic tank discharges increase. Solid waste management, including controls over littering and centralized refuge collection and disposal, is also needed. Sewerage linkups to treatment plants and outfalls are needed by many urban subdistricts and villages.

Despite the problems cited above, coastal resources in American Samoa are in good condition, and the government and villages appear resolved to discourage negative impacts.


PACIFIC OCEAN
170°42'W
WEST VAIFANUA CO.
POLA ISLAND
NUUSETOGA ISLAND (BARTLETT ISLAND)
SUA CO.
MAUPUTASI CO.
LEASINA CO.
LEALATAUA CO.
SA'ILELE
ONENOA
TULA
EAST VAIFANUA CO.
VATIA
MASEFAU
AFONO
MASAUSI
FAGA'ITUA
ALAO
UTUMEA
ATU'U
ANUA
LEL0ALOA
AUA
PAGO PAGO
ANASOSOPO
UTUSIA
AMAUA
AUTO
ALOFAU
AUASI
AMOULI
AUNU'U
AUNU'U ISLAND
FAGATOGO
UTULEI
FAGA'ALU
FAGASA
ALEGA
LAULI'IFOU
AVAIO
AUMI
LAULI'ITUAI
SA'OLE CO. (PT.)
PAGO PAGO HARBOR
MATU'U
FAGANEANEA
NUU
NU'UULI
FATUMAFUTI
TAFANANAI
MAPUSAGATUAI
MAPUSAGAFOU
AASU
FAGAMALO
MALOATA
FAGALI'I
POLOA
AOLOAUFOU
EASTERN DISTRICT
WESTERN DISTRICT
14°18'S
TAPUTAPU ISLAND
SE'ETAGA
NUA
ASILI
AFAO
AMALUIA
LEONE
AMANAVE
FAILOLO
AGUGULU
UTUMEA
FALENIU
LEPINE
TAFUNAFOU
PAVA'IA'I
ITU'AU CO.
ITU'AU
FUTIGA
ILI'ILI
VAITOGI
TAPUTIMU
MALAELOA
VAILOATAI
TUALATAI CO.
TUALAUTA CO.
170°42'W
1
2
3
TUTUILA ISLAND
169°40'W
ALAUFAU
SILI
OLOSEGA CO.
OFU
OFU CO.
OLOSEGA
NUU ISLAND
OFU ISLAND
OLOSEGA ISLAND
14°12'S
169°30'W
FALEASAO
FALEASAO CO.
MAIA
LEUSOALI'I
OLUMA
SI'UFAGA
FITI'UTA CO.
TA'U CO.
TA'U ISLAND
4
MANU'A DISTRICT
MANU'A ISLANDS
169°40'W
169°30'W
SYMBOLS
— DISTRICT
— — COUNTY
o VILLAGE
LEGEND
1 WEST TUTUILA
2 CENTRAL TUTUILA
3 EAST TUTUILA
4 MANU'A ISLANDS
O O LINE SEPARATES NORTH TUTUILA FROM SOUTH TUTUILA
1 0 1 2 3 4 MILES
SAME SCALE FOR ALL ISLANDS

AMERICAN SAMOA WATER RESOURCES STUDY
MAP 7

U.S. ARMY ENGINEER DISTRICT, HONOLULU

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TRUST TERRITORY OF THE PACIFIC ISLANDS (TTPI)

In 1946, the United Nations established the Trust Territory of the Pacific Islands to place Japan's previous colonies in Micronesia under U.S. control and prepare individual island groups for self-determination and independence. Originally, the TTPI consisted of six districts, including four Caroline Island districts (Palau, Yap, Truk and Pohnpei), the Marshalls, and the Northern Marianas. Each was governed by a District Administrator and a local government staff. TTPI headquarters were in Saipan. In 1976, the Northern Marianas opted for commonwealth status under the U.S. flag. Later, a new district, Kosrae, was separated from the rest of the Pohnpei District (Map 13).

Since the late 1970's, island peoples and their leaders have endorsed a Compact of Free Association to divide the Carolines into two sovereign nations: The Republic of Palau (Belau) and the Federated States of Micronesia (FSM) (Yap, Truk, Pohnpei and Kosrae). The Republic of the Marshall Islands constitute a third sovereign nation. Congress and the Administration have approved the Compacts for the FSM and Marshalls, and should approve the Compact for Palau soon. The U.S. will be submitting the Compacts to the United Nations for ratification in the summer of 1986. Under the Compact, the new nations would be self-governing, but defense will remain the responsibility of the United States, which will also provide funds for economic development and other assistance. Military access to the new nations will be denied to all other foreign powers. TTPI headquarters in Saipan is presently being dismantled and administration is being transferred to each of the fledgling nations.

Physiography: An Introduction

The Caroline and Marshall Islands lie in the heart of Micronesia south and southest of the Marianas and northwest of the Gilbert Islands, the other two main island groups in Micronesia (Map 13). The complex and elongated Caroline chain stretches nearly 2,000 miles between longitudes 13' and 163' West, and spans 5' of latitude (4-9' North) excluding a few outlier islands. The Palau and Yap island groups of the western Carolines are mixes of high volcanic islands and coral islands or atolls. Near the center of the Carolines is Truk, a complex of high volcanic islands within a large circular barrier reef lagoon surrounded by outlier atolls. The eastern Carolines consist of the high islands Kosrae (Kusaie) and Pohnpei (Ponape) along with the atolls of the Ponape State (Map 14).

The geology of the Carolines is extremely complex. The Palau and Yap groups lie in a region of trenches and active plate tectonics near the "andesite line." Uplifted reefs also characterize much of Palau. Both Palau's and Yap's volcanic islands are probably a mix of continental lavas and oceanic basalts, whereas the rest of the volcanic islands in the central and eastern Carolines consist entirely of oceanic basalts. The oldest coral reefs probably originated during the early Cenozoic era. It is difficult to calculate the water area under the jurisdiction of the Carolines, but including the exclusive economic zones (EEZ) to the 200-mile limit, it easily exceeds a million square miles. The Carolines have over 3,300 square miles of lagoon; and only 489 square miles of land area spread over about 957 islands.

The Marshall Islands are entirely coralline atolls atop volcanic bases of at least Cenozoic age. They lie west-northwest of the Carolines between longitudes of 163-173' West and latitudes 4-12' North. The atolls vary from small (Knox, Ebon, Namorik, Lae) to large (Jaluit, Enewetak). Kwajalein encloses the world's largest atoll lagoon. A few coral islands lack lagoons altogether (such as Kili, Lib, Jabwot). The Marshalls form two parallel chains trending northwest to southwest. The Marshallese refer to the eastern chain as Ratak (or "sunrise") and the western chain as Ralik ("sunset"). The Marshall Islands, including EEZs, cover nearly half a million square miles of water area, but total land area is only about 70 square miles divided among 1,225 small coral islets and cays. There are 4,307 square miles of lagoon, more than in the Carolines.

Caroline Islands History

The Caroline Islands, with at least 9 separate languages, have a more complex cultural history than the Marshalls. Except for two atolls south of Pohnpei (Kapingamarangi and Nukuoro), the islands of the Carolines and Marshalls are populated entirely by Micronesians. The Micronesians probably first migrated to the islands about 1500 B.C. These settlers probably originated in the Malay archipelago, in the islands and waters bounded by Indonesia, New Guinea and the Philippines. Archaeological evidence (which is scant) suggests that while later settlers came from the east (Marshalls and Gilberts), the Carolines and Marshalls were first settled by waves of colonizers generally moving from west to east. The first area settled was probably Palau followed by the high islands of Yap (1000 B.C.); then the high islands of Truk (500 B.C.0, then the low outer islands and atolls of Yap, Truk and Pohnpei (0 B.C.); and finally Kosrae and the Marshall Islands (500 A.D.).

Polynesians reached Kapingamarangi and Nukuoro about 1200-1400 A.D. from the southeast, probably from the Ellice Islands (Tuvalu). It is probable that Melanesians reached Belau and mixed with the Micronesians during prehistoric times.

Later waves of Micronesian colonizers probably displaced earlier groups on some islands. Typhoon waves and storm surges probably led to local extirpation of islanders from some atolls that were later colonized by other groups.

The Spanish were first to establish contact and claims in the Carolines, but their influence was sporadic. The first Western contacts came from missionaries, whalers and explorers, some of whom brought diseases that decimated local populations (particularly in the 19th century). German influence in the Carolines grew rapidly after establishment of the copra trade in the Marshalls and Bismarck's formation of the German Empire in 1871. To quell disputes between German and Spanish interests, Pope Leo XIII granted sovereignty over the Carolines to Spain but trading rights to Germany in 1885. In 1886, Spain attempted rapid colonization of the Carolines, provoking some islanders to war. After Spanish and Filipino mercenaries lost three battles to Pohnpeians from Kitti, Madolenihmw and Sokehs, Spain ceased to be a recognized power in the region. Germany bought the Carolines and Northern Marianas from Spain just after the Spanish-American War and was generally efficient and intelligent in its rule. Micronesian customs, traditions and land rights were generally respected. However, there was a major rebellion by a group of Pohnpeians in 1910, following a domestic dispute involving a German foreman's mistreatment of a Pohnpeian worker. The rebels killed some Germans and established fortifications on Sokehs mountain. In early 1912, German warships and troops quashed the rebellion. The instigators were executed, and the entire population of Sokehs (except for one family) was exiled to Palau and Yap. Germany also confiscated the entire Sokehs District of Pohnpei.

German administration came to an end in 1914 when Japan declared war on the German Empire. By the end of the year, Japanese forces were established on all the main islands, and these forces ruled Micronesia until 1920. The League of Nations then mandated Micronesia to Japan with the stipulation that military bases and forces not be established. After 1930, Japanese influence in Micronesia increased rapidly, particularly in the Carolines. It became clear that the Japanese were more interested in colonizing Palau, Ponape, Truk and, to a lesser extent, Yap themselves than in encouraging native peoples to expand to these areas. By 1940, the total number of Japanese residing in the

Belau, Pohnpei, Saipan, Truk and Yap were 25,768, 8,048, 45,922, 4,128 and 1,933, respectively. The Japanese instituted education and indoctrination to turn Micronesians into Japanese nationals. Full-scale militarization by Japan in Micronesia began in 1935, after Japan left the League of Nations, with major military bases established on Truk and Belau. Although other Caroline Islands were less developed militarily, many inhabitants lost their land or use of it to the Japanese military effort, the war, or to economic development by Japanese trading companies. Many became slave laborers and fighters for the Japanese, and wartime casualties were high. Many others evacuated coastal villages and moved into the mountains.

Socio-economics

Japanese rule ended in 1945 and Japanese nationals were deported. American occupation forces were not equipped to resolve many of the land disputes and inequities, but generally took control of all "government" lands previously held by the Japanese. Parcels of land were leased to the Micronesians, but records of leases and of their rationale are poor. Eventually such records were maintained, but land ownership is still very confused on islands where the Japanese presence had been major. Micronesian courts are flooded with land dispute cases, and resolution may take many more years.

After the war, the Micronesian islanders began to rebuild and reoccupy their village and garden sites and clean coconut plantations. More than a century of severe depopulation ended and virtually all islands in the Carolines (and Marshalls) continue to experience a phenomenal population growth of 3-4 percent per year. The median age is between 15 and 16 years, and many of the small populated atolls are crowded.

Four decades of American administration in the Carolines (and Marshalls) have brought very little economic development, and nearly all fishing and agriculture is subsistential in nature. Most funds coming into the TTPI have gone to government service, expenditures and capital improvement projects (CIPs), and the government is the chief employer. Copra trade continues to offer employment on the atolls, but many trees are old and little profit is generated. Tourism and light industry has been established at all district centers. Although Micronesians do not fish commercially, revenue from foreign fishing is expected to rise. However, commercial fishing activity by the Micronesians appears to produce less than subsistence catches. Some of the islands have great potential for fruit and vegetable export (Kosrae, Pohnpei, Babelthuap). Many fruits/vegetables have been introduced but not yet produced commercially. There is also potential for pelagic and lagoon fishery development. Major fishery initiatives have been planned for Dublon (Truk) and Koror (Palau) and aquaculture research is being conducted on Palau and Pohnpei. Nevertheless most of the fishing and agricultural activity will continue to support subsistence needs.

The islands' traditional subsistence economies have been undermined by a century of foreign influence, trade, control and warfare. From the time of the whalers and missionaries, the islands have exchanged services or money for desired foreign goods. The Japanese in particular disrupted land-use controls and ownership customs and permitted greater public access to resources and undermining traditional conservation. The American administration has done little to reverse these trends. In fact, islanders previously denied access to specific resources or reefs may benefit from the present situation.

The American administration in Micronesia funds a government welfare state characterized by increasing demand for foreign goods and the substitution of a "cash economy" for traditional lifestyles.

Kosrae

The State of Kosrae consists of one very large and four smaller volcanic islands centered at 163° West and 5°30" North. Total land area is 42 square miles, making Kosrae the fourth largest island in the Carolines. There are no outer islands and atolls in this state. Because of previous losses to disease, Kosrae is sparsely populated (6,500), but population growth is presently very rapid. Most people live in the several villages with the largest occurring on the island of Leluh (or Lelu, the capital) and the remainder along the coast of the main island at Tafunsak, Utwa (Utwe), Malem, Tofol and Welung. A new village is developing at Okaht (Map 16).

Road, dock, airfield, power distribution, and hydropower improvements have been or will soon be completed for Kosrae. These could expand economic development opportunities for agricultural exports (especially fruits and vegetables), tourism, offshore fisheries, and fish processing.

In the geological past, a shallow lagoon and barrier reef system probably surrounded the high island which presently has a maximum elevation of 2,064 feet. However, the lagoon has nearly filled with sandy loams, and much of it is covered by dense forest and mangrove swamps. Seaward of the swamps, raised sand and rubble beaches mark the position of the relict barrier reef. Areas of reef flat extend out to the breaker zone. Several villages are located on the outer beaches and are connected by waterways through the mangroves. Natural deep harbors and lagoons occur at Leluh on the east coast, on the south coast at Taf and Utwac, and on the northwest coast of Okaht.

Marine and coastal resources other than wetlands have not been extensively surveyed at Kosrae, except at Okat in conjunction with earlier environmental planning for a dock and airfield project. Coastal resources of importance include extensive and complex mangrove swamps encircling the high island (except along the southeast reach); seagrass beds, (especially on the inner portions of wide reef flats); coral reefs, (especially the northern half of the island and at the embayments to the south at Taf and Utwa); several stream mouth estuaries scattered around the island; the deep lagoons and natural harbors; and the sand beaches along most coasts (but especially along the eastern shores). At Okat, valuable coral reefs, mangroves, seagrass beds, estuaries and riverine ecosystems all occurred in proximity to one another pristine state until recently. Tafunsak's chief subsistence fishery was also here.

Management Problems

Subsistence gardening and fishing have been the primary economic activities since the 1960's, and the TTPI administration developed Kosrae's political, physical and social infrastructure in the 1970's. Kosrae's coastal resources were spared the impacts of military development, war and major economic development, but this trend is changing rapidly. For years, Kosrae was administratively a part of the Ponape District of the TTPI and received only limited capital improvement funds. However, in 1977, it achieved separate district status, then state status under the FSM. Major post-1980 public works development projects have included the completion of an offshore airfield and port project on Okaht reef, a power distribution to all major villages, and a circumferential road around the island. Future possibilities include hydropower, agricultural export (especially fruit and vegetables), tourism, fisheries, and fish processing. Despite American efforts to foster self-sufficiency, Kosrae is heavily dependent upon foreign goods and services as a result of gradual acculturation to western values and habits.

Dredging and filling in conjunction with the airfield-port project at Okat was particularly damaging to previously undisturbed coral reefs and seagrass beds there. An environmental impact statement was prepared by the federal sponsors (FAA, Navy), and the project was subject to Corps permit and numerous special conditions to protect the environment. However, construction still entailed considerable avoidable impacts, including sedimentation on coral reefs, burial of seagrass beds, and excessive dredging and filling. Many of the special permit conditions were simply ignored by the Navy and its south coast at Taf and Utwac, and on the northwest coast of Okaht.

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The fishery catch at Okaht has subsequently declined. With access to many new acres of fill land on the reef, the local government is now continuing to dredge and fill at Okaht to provide "free" space for light industry, fuel storage and other facilities. Although there is need for such facilities in the long run, the destruction of additional coastal resources cannot be justified and can be avoided simply by placing such facilities on land. These additional fill activities are subject to Corps permit under Section 404 of the Clean Water Act, but it is likely that a stream of new dredge and fill projects will be approved. Eventually the Corps permit program will terminate with UN ratification of the FSM Compact. Thus, over the long run, one of Kosrae's most valuable coastal ecosystem complexes is being destroyed by construction and development that could easily be located elsewhere. Ironically, no commercial jet airline company has yet committed itself to using the island's new 6,400-foot, $20 million airfield. Pacific Missionary Aviation provides limited commercial, administrative and emergency air service to Kosrae but requires a runway of only 2,500 feet.

The circumferential road project, also subject to Corps permit, is probably causing some avoidable damage to archaeological resources, mangrove swamps and perhaps estuarine habitats. Environmental resource surveys prior to construction were inadequate. "Borrow" sites have been opened up on reef areas (including scenic areas) to obtain fill and aggregate for the road work. It is not clear whether these areas will be restored.

Other environmental and coastal resource management problems in Kosrae (including the need to manage wastewater discharges and solid waste disposal, especially near Leluh) are minor, but will continue to grow with the population unless remedial actions are initiated. EPA has initiated a sewage treatment plant and outfall project for Kosrae. Construction of a causeway between Leluh Island and the mainland should have required a Corps permit, and it reduced circulation in Leluh Harbor by needlessly blocking a culvert. Water quality impacts, if any, have not been documented. Urban landfills constructed on Leluh are relatively small and scattered and have no obvious environmental impacts.

The Corps is now planning to use its authority under Section 22 of the Water Resources Development Act (Planning Assistance to States) to sponsor a coastal resources inventory, similar to the one completed for Pohnpei. This idea has strong support from the local government. These inventory projects are important because they allow design of management and development plans to avoid unnecessary damage to important resources. The imminent UN ratification of the FSM Compact may render Kosrae (and the rest of the Carolines and Marshalls) ineligible for future Section 22 projects.

Pohnpei

The Pohnpei state consists of a high island complex of 129 square miles at 7°N and 158°W (Map 17), and several groups of atolls to the west (Oroluk, Minto Reef, Pakin, Ant), east (Mokil, Pingelap), and south (Ngatik, Nukuoro and Kapingamarangi), totalling about 4.3 square miles (see Map 13). The main island complex has a maximum elevation of 2,600 feet. A quarter of Pohnpei's 1980 population of 23,480 was concentrated at the District center of Kolonia. Approximately 3,000 additional islanders live on the outer atolls, some of which are heavily populated relative to their size (Mokil, Pingelap, Kapingamarangi), others of which are uninhabited or sparsely inhabited (Ant, Pakin). Pohnpei's rapidly growing population is expected to double at a rate of every 20 years, and the island is slated to be the capital of the emerging Federated States of Micronesia. Most people on the high islands live in the coastal villages of the five principal districts: Nett, Uh, Madolenihmw, Kitti and Sokehs.

Pohnpei's abundant and valuable coastal resources have been inventoried by Army Corps of Engineers and University of Hawaii scientists. The coral reefs were also analyzed in a study to develop a reef management plan for the island at the local government's request (see reference Holthus, 1985a and b). Pohnpei has several large streams, estuaries, and a large inland natural harbor at Madolenihmw. Well developed mangrove swamps line most high island shorelines, and shallow fringing reef flats extend out into the lagoon. Seagrass beds are abundant on inner portions of the wider reef flats. A well developed lagoon and barrier reef system 1-2 miles wide surrounds the high island (except at the southeast corner) (Map 17), and the lagoon contains many linear, patch and pinnacle reefs. All these habitats support abundant and diverse fin and shell fish populations. Pelagic fisheries occur seaward of the barrier reefs; benthic fisheries may also exist on the lagoon floor. Abundant reef fish, mangrove crab, sea cucumbers, top shell, blood cockles, lobsters, sea turtles, giant clams, octopus, bottom fish and pelagic fish are harvested from Pohnpei's coastal zone.

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Lagoon and ocean reef fisheries are assumed to be important to the diet of the atoll islanders. Recently, a missionary organization, Pacific Missionary Aviation, organized villagers in the outer atolls to construct short airfields for emergency air evacuation, better communication and mail service, and improved administration. Airfields have been completed on Pingelap and are being constructed on Mokil and Ngatik.

Despite Pohnpei's abundant rainfall and potential for agricultural and fishery development, the main island has experienced little economic growth during the four decades since Japanese rule. The Japanese developed a hydropower plant on the Nanpil River near Kolonia (the capital) which is being restored and upgraded by a Corps-managed construction project. Hydropower development has also been proposed for the Lemnesi River. An agricultural research station is located in Kolonia. Pohnpei pepper is presently exported on a small scale as a gourmet item. Copra, handicrafts, mangrove crab, and top shell are also exported, and mariculture operations appear to be expanding. A fledgling College of Micronesia is being upgraded including a major construction project on the Paliker campus, and the planned FSM capital complex in the Kitti District will constitute another major development project.

Because of better health care and socioeconomic conditions on land-rich Pohnpei, many outer atoll islanders have migrated there and reside near Kolonia or Sokehs in immigrant "villages." A number of house fills along the shoreline have been approved by the Corps to accommodate the need for additional habitation structures.

Management Problems

Recent surveys indicate that most of Pohnpei's coastal resources are healthy but that reef degradation, overexploitation of resources and use conflicts are problems. Considerable mangrove lagoon reef and perhaps seagrass habitat has been destroyed or degraded by recent dredge and fill operations on shallow flats. Causeway and landfill construction near the port and airfield area of Kolonia and sedimentation from upland construction has destroyed some habitat and blocked circulation. The circumferential road project for Ponape required sources of aggregate for fill, and most was obtained from reef "borrow sites". Operating the borrow sites involved dreding and villing, and some "borrow sites" have not been restored. The selection of coral reef sites as a source of fill materials is largely dictated by the local government's view of reefs as a "free" resource, not requiring monetary compensation as in the case of acquiring fill from private landowners. Crowding and land shortages have spurred immigration from the outer atolls and led to additional landfilling along the shorelines and mangrove areas in the Kolonia-Sokehs area for residences. To date, the proliferation of houselot fills has not had a serious environmental impact, but the trend is clearly escalating and future cumulative effects may be severe. There has been little effort to plan and locate such fills to minimize environmental and social effects. Until the Compact is ratified by the UN, fill activity is subject to Corps permit under Section 404 of the Clean Water Act.

A major emerging problem is increased fishing pressure from rising populations and over-fishing of preferred species, especially in reef and lagoon waters. Top shell (Trochus) reserves have been established to control over-harvesting. Since most fishing in the lagoon is for subsistence purposes, it is important that renewable resources be conserved. Holthus (1985a and b) is attempting to develop and coordinate a reef management plan for the main island of Pohnpei working with and at the request of the state marine resources office. Some examples of the type of management strategies he is analyzing include: (1) preservation and protection zoning, (2) multiple and sustainable-use zoning, (3) construction and development zoning, (4) facilities siting, (5) water quality monitoring, (6) environmental permit procedures, (7) fisheries conservation legislation, (8) emergency-contingency planning, (9) environmental quality monitoring, and (10) detailed management plans in areas subject to use conflicts. If adopted and implemented by the government, this plan could help to conserve reef and related coastal resources and serve as a model for other high islands in Micronesia.

Other coastal resource problems in Pohnpei include water and solid waste pollution. EPA is planning and constructing outfall sewage treatment facilities near Kolonia which should help eliminate problems of domestic sewage pollution. However, funds and authority are insufficient for individual house and business hook-ups to the new facilities. Solid waste is a serious emerging problem in Ponape and within the TTPI in general. There seems to be little planning to designate sites and landfill operations. Rubbish and solid waste is indiscriminately dumped, often in shoreline environments.

The outer islands and atolls have experienced other problems, including overcrowding and possibly poor nutrition. The recent construction of airfields using manual labor on some of the atolls may have economic and social benefits. Some critics maintain, however, that construction and the new airfield landfills on reefs may have aggravated shoreline erosion on nearby islands and reduced available fish habitat. Placing even short airfields on land can remove a considerable amount of productive copra and agricultural acreage from service. Clearly, a more systematic planning and development process for both airfields and docks is warranted in the land-limited outer atolls. Since improved transportation and communication are vital to the welfare of the outer islanders, federal interest in such projects may be warranted. Little attention was paid to this need by the TTPI capital improvements program.

Truk

The State of Truk between 5' and 9'N latitude and 148' and 154'E longitude includes a central high island and lagoon complex (7'3'N, 151'45'E) plus two low coral islands lacking lagoons and several groups of outlier atolls. Kuop Atoll is just south of Truk Lagoon; the upper Mortlocks consisting of the islands of Nama and Losap atoll are nearby to the southeast. Further southest of Truk are the lower Mortlocks, which consist of the atolls Namoluk, Etal, Lukuno and Satawan. To the north are the Halls, which consist of the atolls Murilo, East Fayu and Nomwin. To the west are the Westerns, which consist of the atolls Pulap, Puluwat, Pulusuk and Namonuito (Map 18). A total of 39 squares miles of land area is divided among six major high islands and a number of smaller islands within Truk Lagoon which is 822 squares miles in area. The outer atolls total about 10 square miles of dry land and 1,208 square miles of lagoon. With a projected 1985 population of 46,000, Truk is the most populous and crowded district in the Trust Territory. Over two-thirds of this population resides on Moen (the capital), Dublon, Fefan, Uman and Tol Islands. Moen, only 7.3 square miles in area, had a 1973 population of 9,568 (and is higher now).

Following Darwin's barrier reef model, the reef of Truk lagoon is intermediate between true barrier and atoll reef stages. Only the "drowning" peaks of once larger volcanic islands remain in the lagoon; typically these are steep sided with little coastal plain suitable for habitation and are fringed by narrow coral reef flats. Stands of mangroves are found within some protected embayments (for example, Pou Bay on Moen). The mangroves are extremely rich in edible fish and shellfish. Seagrass beds are reported on some shallow reef flats. The large lagoon reaches depths of 200 feet or more and is floored by sand and fields of Halimeda, a green alga. A few coral islands and cays sit atop the shallow barrier reef surrounding the lagoon. Islanders often visit these to harvest coconuts and to fish. However, virtually all Trukese live in scattered coastal villages on the lagoon's main volcanic islands. Beyond the barrier reefs are deep ocean fishery stocks. Most villages consider the fringing reefs valuable resources for the harvest of sea cucumbers, shellfish, crabs, and schooling fish. Most fishing is done by hand (and primarily by women), although some spear, pole-and-line, dynamite fishing, gill netting and handlining is practiced on reefs and in protected embayments. Pou Bay is the most popular fishing spot on Moen.

The Japanese presence and World War II affected this district more strongly. In 1940, over 4,000 Japanese nationals were residents on islands in Truk lagoon, and during World War II, Truk became a center for the Japanese Imperial Navy in the western tropical Pacific. Dublon Island was fortified as fleet headquarters. In 1944, American forces conducted surprise aerial bombings at Truk, essentially destroying the fleet and minimizing Truk's role in the rest of the war. Perhaps as many as a hundred ships and submarines were sunk and thousands of Japanese soldiers killed. The shipwrecks are now highly significant historical, cultural and recreational sites. Memorials to the war dead have also been erected in the islands, and thousands of sports divers, Japanese veterans and other tourists visit Truk each year. However, Truk is not as scenic and pristine as some other islands in the Carolines, and expansion of the tourist industry there will require active involvement of the villagers, government and developers.

Truk is severely depressed economically, and overcrowded conditions on some islands in the lagoon are affecting the health and welfare of the people. In particular, water supply and quality are unreliable. Tourism is an important economic activity at Truk, primarily due to the significance of the shipwrecks. However, Truk is not as scenic and pristine as some of the other main islands in the Carolines, and expansion of the tourist industry there will require active involvement of the villagers, government, and resort development intersts in order to identify and improve visitor destination sites. At present, the islanders depend upon the government in one way or another (jobs, subsidies, services) for money. Most Trukese have subsistence livelihoods. The Trust Territory government has constructed (or is planning to construct) large fisheries docks and complexes on Dublon, Moen and Tol islands, which can potentially generate jobs and money. No other economic development activity at Truk is evident.

Crowding on Moen and to a lesser extent on Tol, Dublon, Fefan and Uman has led to slum-like conditions in some villages, unreliable water supply and quality, and unsanitary wastewater disposal practices. Although a sewage treatment plant and outfall on Moen have been in operation for many years, laterals and hookups with residences are few. Outfalls are being constructed and planned for Dublon and other islands. Many of the islanders still use over-the-water outhouses--termed benjos--for defecation; when population levels were lower, this may have been acceptable, but now nearshore coastal waters are clearly a hazard to public health. Recent cholera outbreaks at Truk have generated considerable publicity. Solid waste disposal is also a serious problem; presently, a major mangrove system inappropriately serves as Moen's main dump. As on other islands in Micronesia, rubbish (particularly paper, bottles and cans) are also indiscriminately dumped, often in coastal waters. There is also no suitable means of disposing of potentially harmful material such as petroleum products, electrical transformers, paint, batch chemicals, etc.

Moen's coastal resources were inventoried during a Corps-sponsored study but only scattered or qualitative information is available for the other islands. In general, coastal resources in Truk are heavily exploited to support the large subsistence population, and many coastal habitats have been degraded. Most reef flats in the lagoon are owned by adjacent islanders; access by others including immigrants or non-landowners is restricted, controlling exploitation of owned reefs but aggravating exploitation of "open" reefs.

Dynamite fishing is widespread in Truk, ostensibly due to the availability of unexploded ordnance from many Japanese shipwrecks. Though there is a little public pressure to stop the practice, it is without question responsible for considerable destruction of reef corals and reef fish habitat. A large amount of World War II hazardous chemicals, explosives, fuel and other pollutants occur in the sunken fleet in Truk lagoon. These require inventory, evaluation and cleanup or removal. Recovery of corals in holes previously blasted or bombed during World War II has been relatively minor.

Other resource management problems include proliferation of houselot fills in coastal waters; previous construction of a causeway across Pou Bay which blocked circulation and degraded water quality there; and some shoreline erosion due to collection of sand for construction fill. Expansion of the reef runway on Moen involved considerable dredging and filling of reefs near Mechitiu and Iras villages. Corps permits for this work require monitoring of water quality and deployment of silt screens to control turbidity, but the screens were improperly installed and were thus ineffective. Airport construction was opposed on historical grounds and disputes over land ownership. The airport was built on lands originally owned by Iras villagers;

later confiscated by the Japanese; and then transferred to the Trust Territory government. The present status of court cases on land claims is unknown.

Potential dredge and fill projects include perimeter road construction or maintenance on Moen and other islands. Some of the borrow sites to obtain sources of "free" construction aggregate for the roadwork are not environmentally suitable due to the subsistence use of the reefs to be affected. The number of hoselot fills will increase in future years. Reports from diving groups suggest that Truk lagoon is becoming so polluted that, unless waste disposal in the lagoon is minimized, divers may venture elsewhere in the future, reducing this tourist income (one of its few income-earners).

Truk is sorely in need of economic development and natural resources conservation. Expansion of the Moen coastal resource inventory to other islands and reefs in Truk lagoon would be an important first step. Other federal support may be needed unless the funding eligibility requirements under Section 22 are relaxed. Some outer islands may also require additional transportation (docks, airfields), water catchment and modern communications facilities, with appropriate engineering and environmental planning.

Yap

The Yap State, situated in the western Caroline Islands between the Republics of Palau (Belau) and the State of Truk, is a complex of several interconnected high islands (Yap Islands proper) with atoll groups to the southwest, southeast and east. The state lies between longitudes 138'-149'E and latitudes 6-12'N (Map 18). Its urban center, Colonia, is situated on the Yap Islands (9'30'N, 139'E). Total dry land area in the state is 46 square miles, nearly 39 square miles of which are the high island complex (Yap Islands). Total water area enclosed within lagoons is 405 square miles for the entire state (10 square miles for the Yap Islands proper). The state's largest atolls are Ulithi, about 100 miles east, and Woleai, about 400 miles east-southeast of the Yap Islands. The other atolls are Ngulu, Soral, Euripik, Ifalik, Faraulop, Olimarao, West Fayu, Elato, and Lamotrek. Outer coral islands without lagoons are Fais, Gaferut, Satawal, and Pikelot. The projected 1985 population in the state is about 10,950. The 1970 census showed 7,020. Over 65 percent of the population reside on the Yap Islands proper.

The Yap Islands proper are a series of metamorphic and volcanic high islands of moderate slope with dendritic and lobed shorelines enclosed by a triangular reef complex. Lagoon waters are limited. The dominant reef type along most shorelines is fringing. Road causeways now connect all the islands but Rumung.

World War II was particularly disruptive to the environment and people of Yap. Today the islanders are relatively close-knit, reserved with foreigners, and resistant to change.

The Yapese of the main islands presently own or control the use of their fringing reefs. Traditional subsistence lifestyles dominate, and there has been little modern economic development since the termination of Japanese rule four decades ago. The main wage employers are the government and small service businesses in Colonia, the state's main town. Tourism is still a relatively minor industry on Yap. On the outer atolls, the copra plantations provide some income and employment opportunities.

Yap has been evaluated for shellfish aquaculture potential, and the commercial dock has been improved to promote commercial shipping and fishing. Aquaculture ponds and a fish processing (canning) and transshipment facility is being investigated for the main Yap islands. Construction of a small leeward fishing harbor and a larger fisheries dock in Colonia are under way.

Aside from the Corps-sponsored wetland inventories, there have been several TTPI-sponsored marine biological surveys in the Yap Islands, as well as marine environmental studies on Ulithi Atoll for proposed sewage treatment facilities. The Federated States of Micronesia recently sponsored environmental studies to aid in siting proposed dredging projects in Yap lagoon. Yap's most important coastal resources are its coral reefs, mangroves, seagrasses and algal habitats which occur within concentric zones around the island's perimeter reefs. There are also several natural deep water harbors, including Tomil and Gabach on the east coast, Gofenu on the north coast, and Mil on the west coast. Sandy beaches are not common.

There has been a problem with sewage pollution in confined coastal waters and lagoons, but EPA has been working to clean this up. Construction of sewage outfalls and treatment plants has been accomplished or is planned for the Yap Islands and Falalop on Ulithi. Solid waste disposal and landfill management continue to be challenges, here as in other districts.

By far the most important concern is with the impacts of various coastal dredging projects. Yap has no exposed limestones or other suitable rocks available for fill, roadwork and other construction activities, and materials must be dredged from lagoon reefs. Additional sand dredging is needed to maintain Tomil channel for navigation. There will be an important future need for improved docking facilities on the outer atolls which may also involve dredging and filling. The Yapese government seems cognizant of the need to site borrow and dreding areas to minimize impact, and has expressed strong interest in Corps support for coastal resource inventories. So far, there has been no federal commitment to these needs.

Palau

Belau (Palau), the westernmost and largest of the island groups in the Carolines, consists of a main high island complex centered at 134'30'E longitude and 7'30'N latitude and several outer reefs and atolls (Maps 19 and 20). Total dry land area in Palau is nearly 191 square miles and includes the Carolines' largest island, Babelthuap (or Babeldoab; 153 square miles). Other large islands include Koror (the capital; 4 square miles), Peleliu (4.5 square miles) and Angaur (3 square miles). Other important islands within the main high island and barrier reef complex include Arakabesan, Urukthapel and Eil Malk. To the north are several reefs and atolls including the Kayangel Islands. Within 350 miles of Angaur to the south are several other coral islands and reefs: Sonsoraol, Pula Anna, Tobi and Helen. The projected 1985 population for all of Palau is 17,600, low considering the District's land area. Most of the population lives in Koror, the capital.

A spectacular barrier reef/lagoon system surrounds the high island cluster punctuated on the east by wide passages, including Malakal Harbor. The barrier reef complex extends roughly 80 miles north to south. A number of beautiful coral islands (the rock islands), are found in the lagoon, adding considerable ecological diversity to Palau. The reef rock comprising these and many portions of the larger islands were formed when relative sea level was higher. Palau sits on a tectonically active section of the ocean floor between the Yap Trench (immediately to the east) and the Philippine Trench (further to the west). It is very close to the Philippines, Sulawesi (Celebes) and New Guinea, areas with extensive and diverse coral reefs, and 200 miles southwest of the Yap Islands. Palau has attracted considerable scientific interest because of its highly diverse terrestrial and aquatic ecosystems, which could include many unique (endemic) species.

In 1900, the reported population of Palau was 3,750. Populations may have declined to that level upon exposure to western diseases and warfare. After 1914, Japan took possession of Belau recognizing its strategic location and great potential for economic development and colonization. Large plantations were set up and bauxite and phosphate deposits were mined. Prior to World War II, Japan established a marine biological station at Koror, Palau, which sponsored considerable research on coral reefs. The Japanese saw the islands as an extension of Japan, and by 1940, over 25,000 Japanese nationals resided in Palau, easily outnumbering the approximately 6,000 native islanders. World War II action included a bloody 1944 battle at Peleliu and aerial bombing of Japanese fortifications and facilities at Koror, nearby Malakal and Airai. After Japan's surrender in 1945, U.S. forces entered Koror and all Japanese were deported. Since the war, native Belauans have reoccupied the coastal villages where practically the entire population presently lives.

The physiography of Palau is quite variable. Babelthuap is a primarily volcanic rolling upland, incised by streams. Flat alluvial areas occur at the mouths of most streams and behind sand beaches on the northeast coast. Rugged cliffs and ridges characterize the western and southeastern coasts. In the northwest is the island's highest point (794 feet). Koror is partially volcanic and partly raised limestone. Arakabesan, Angaur, Peleliu and Urukthapel are raised limestone islands. Low coralline islands occur on the barrier reef encircling the lagoon and on the Republic's outer atolls and reefs.

The Spanish, British, Germans, Japanese and Americans have variously tried to develop Belau for mining (Angaur), agriculture, fisheries and aquaculture and tourism. Japan once proposed development of a superport to service transshipment of oil to Japan, but negative publicity killed the project. At present, government employment provides about half Palau's income. Tourism, and private businesses and services centered in the Koror area, contribute the rest. Outside of Koror and southern Babelthuap, most of the population practices a subsistence lifestyle.

Spectacular natural beauty, numerous islands and beaches, and excellent diving opportunities give Palau great tourism potential. It is also positioned near several rich deep-sea fishing grounds. Fishing leases, rental of port facilities and fish processing could generate considerable revenue.

The government at one time or another has invested in agricultural fisheries and aquacultural research. Large capital improvement projects have included docks; a new high-span bridge between Koror and Babelthuap; improved roads, a new jet airport, improved and expanded port and docking facilities, and sewage treatment and outfall facilities for Koror. Private interests are presently investing heavily in new resorts; several are under construction or in the planning stage. Many Belauans farm, garden, fish, and raise pigs and chickens. It is the government's plan to feed the tourists using such home grown products, and to promote only such tourism as will benefit the Belauans. The U.S. military also has options under the Compact of Free Association to lease and use: (1) many hundreds of acres of land in Babelthuap for military training exercises; (2) the commercial airfield and an auxillary airfield on Anguar; and (3) 40 acres of coastal land adjacent to Malakal Harbor.

Although Palau's cultural environment has suffered from events of the past few centuries, its natural environment is presently healthy. Its coastal resources have not been adequately inventoried, but it is clear that abundant and diverse terrestrial and aquatic ecosystems occur, including limestone forests, rainforests, mangrove swamps, and other wetlands, beaches, coral reefs, seagrass beds, lagoon, estuarine and riverine ecosystems. In particular, reef and lagoon ecosystems are very widespread throughout the islands and outer atolls.

At present, the health of the environment, low population levels, and the relatively large areas of Palau (compared to other island groups) have minimized coastal resource management problems, and subsistence lifestyles are possible outside of Koror. The principal challenge facing Palau is to improve standards of living in the Koror urban center. Although EPA is sponsoring sewer outfalls and sewage treatment plants, additional financial support is needed to link individual houses and buildings to the new facilities. Litter, rubbish and solid waste disposal are problems, as in the rest of the Carolines. Some islands (Peleliu) contain hazardous waste and unexploded ordnance from the war years that should be cleaned up. I was not able to determine whether dynamite fishing is presently a serious problem in Palau.

Future tourist and military development of Palau will need to be carefully planned and controlled. U.S. military actions and projects should be subject to careful environmental evaluation to minimize impacts to valuable species and ecosystems such as the reefs at Babelthuap. Foreign investment in Palau should be of the type and magnitude that confer control and benefits on Belauans. Sale of free lands (those existing or those created by landfilling) to non-natives should be strictly controlled or prohibited. Finally, resort development should be holistically planned for the entire island complex rather than haphazardly implemented. A coastal resources inventory followed by a comprehensive guide for development and use of natural resources is warranted. There has been little federal support for such initiatives to date. Information on management problems and development needs on the outer atolls is not available.

The Compact for Palau was recently approved by the plebiscite and is now before Congressional and Presidential review and approval. It calls for payments of nearly $9 billion to the Republic to be spread out over a 50-year period. This will be the chief source of income to the Government, if not the Republic, and will place Palau in much better financial condition compared to the other new compact nations and states. This magnitude of wealth will undoubtedly stimulate economic development that will need to be planned and designed carefully to avoid adverse impacts to Palau's fragile and valuable natural resources.

Marshall Islands

The Marshall "Islands" consist of 29 atolls and 5 isolated single islands in two chains, the Ratak (to the east) and the Ralik (to the west). To the south, these converge into a single ridge comprising the Gilbert Islands (part of the Republic of Kiribati) and the Ellice Islands (Tuvalu). Total land area in the Marshalls is only 70 square miles, but water area enclosed by reefs and lagoons totals 4,507 square miles. The largest atolls are Likiep (3.96 square land miles), Wotje (3.16), Maloelap (3.79), Majuro (3.54), Arno (5), Mili (5.77), Rongelap (3.07), Kwajalein (6.33), Ailinglapalap (5.67), and Jaluit (4.38). At the other extreme, Kili has only 0.36 square land miles, Taka only 0.22, and Bikor only 0.19. Kwajalein's lagoon is the largest in the world at 839 square miles, more than twice as large as the next largest Marshall atoll lagoons at Maloelap (376 square miles); Enewetak (388); and Rongelap (388). The Marshalls stretch from 161'E (Ujelang) to 174'E (Mili) longitude and from 12'N (Taongi) to about 5'N (Ebon) latitude.

There have been no systematic resource surveys in most of the Marshall atolls, but they are all blessed with abundant reef and lagoon habitat and associated fisheries. The atolls to the south have a much wetter climate and higher incident rainfall advantageous to water supply, and growth rate and productivity of coconuts and other crops. As would be expected, the larger and wetter atolls support larger human populations (Majuro, Kwajalein, Ailinglapalap).

History

Spanish navigators between 1526-1566 were the first westerners to reach the Marshalls, landing at Enewetak, Ujelang and Bikini. Most of the 18th century was a period of rediscovery by Englishmen. Between 1815-1826, the Russian, Otto von Kotzebue, made two Pacific voyages. His visits to and information about the atolls in the Northern Marshalls provided incentive for later traders, whalers, and missionaries.

Until the 1850s, the Marshall Islands were ruled by various rival chiefs who disliked and distrusted Westerners even more than each other. A commercial copra trade opened in the 1860s. The Germans established residences, trading companies, and stations on Ebon, Jaluit, Namorik, Mili, Maloelap, Majuro and Arno. Jaluit became the commercial center. Eventually, the chiefs who controlled land in the Marshalls began to trade it to Germans and other westerners. In 1879, the high Chiefs Kabua and Letabalin of Jaluit signed agreements that ceded to Germany exclusive use of Jaluit Harbor and guaranteed protection to German companies. After consolidation of the German Empire in 1878, the Germans accelerated their colonial interests in Micronesia, concentrating on the Marshalls after Pope Leo XIII confirmed Spain's claim only to the Carolines. In 1885, a Declaration of Protection was signed by the Germans, Kabua, and four other Marshallese chiefs, and thereafter German trading companies controlled economic development in the islands, concentrating on copra and other coconut products. Coconut plantations were established on virtually all atolls. German administration came to an end when Japanese naval squadrons took possession of the islands in October 1914. In 1920, the League of Nations mandated the Marshalls (and other Micronesian islands) to Japan under condition that Japan would (1) promote the material and moral well-being and social progress of the local inhabitants, (2) rule out slavery, traffic in arms and ammunition, and alcoholic beverages, (3) refrain from building fortifications and military bases, (4) permit freedom of worship and missionary activity, and (5) submit an annual accounting to the League. The United States did not agree to sign the mandate until 1922 when Japan agreed to withdraw its armed forces from Micronesia.

The Japanese had a military administration until 1918 and a mixed military-civilian government until 1922. Between 1922-1935, there was a civilian government (headquartered in Jaluit) consistent with the League's mandate. Japanese rule stimulated the copra industry as many of the trees planted during the German rule began to bear fruit and additional acreages were planted. The Japanese also did much to organize the production of handicrafts.

In 1935, Japan withdrew from the League of Nations and began to arm and fortify the Marshalls. They at first recognized all land rights previously in effect as modified by the Germans. However, after 1935, collective clan ownership of lands was displaced by a system of outright land grants to the occupants of individual tracts. After 1937, many Marshallese were dispossessed of their lands via forced sales for the construction of airfields and other Japanese installations. Up to 680 Japanese were reported to be living in Jaluit in 1940. Japanese-imported labor also helped construct fortifications at Kwajalein, Jaluit, Wotje, Maloelap and Mili, and later on Enewetak. At the beginning of the Pacific War, thousands of Japanese troops were brought in, and Marshallese men from many islands were "drafted" to work on military installations. Many Marshallese families were evacuated from strategic lands.

Major World War II battles were fought on Marshallese soil in early 1944. Kwajalein was taken from the Japanese during bloody battles in January and February 1944. The Americans captured Eniwetok (Enewetak) after battles in February 1944. The other atolls were captured with little or no resistance.

Socioeconomics and Management Problems

The American military administered Micronesia during the reconstruction period following World War II, and civilian rule by the Department of Interior was established in 1951. As in the other TTPI districts, American administration in the Marshalls reestablished a normal civilian and subsistence lifestyle in most of the outer islands, subsidized education and health, and provided other services. The copra industry is still the main income generator on most atolls. Some hotels and service industries are established on Majuro, the capital of the Marshalls District under the TTPI administration. Handicrafts provide some revenue, but the health of both the copra and handicraft industries has declined considerably since Japanese rule. There is a compelling need to improve dock facilities on virtually all of the outer atolls and where appropriate to provide short airfields on atolls that can afford the loss of productive copra lands. Commercial fishing potential in the Marshalls is virtually untapped although Majuro has established a marine resources and fishery office. Lagoon and reef fish and shellfish are locally distributed and consumed.

The socioeconomic conditions and management problems on four Marshall atolls (Majuro, Kwajalein, Bikini and Enewetak) depart significantly from those elsewhere and will be discussed separately.Rongelap Atoll could easily be added to this list in view of the recent resettlement of Rongelapese to Mejato and Ebadon on Kwajalein Atoll as a result of islander concerns over contamination from radioactive fallout from nuclear tests conducted at Bikini Atoll in 1958.

Majuro

Prior to 1944, the atoll economy was based upon subsistence horticulture and copra export. Urbanization began when American military forces occupied the main east islands of Dalap, Uliga and Djarrit (DUD). Later, under TTPI administration, Majuro was established as the District capital of the

Marshalls, and there was considerable government-sponsored construction to facilitate government services and to accommodate migration to the center. Extensive dredging and filling connected the three main islands and expanded land area for building. The 1945 population of Majuro was estimated to be 1,237 and the projected 1985 population exceeds 10,000. Over the past two decades, the airport was moved to the south side of the atoll and expanded to accommodate jet traffic. Excellent paved causeways and roads were extended from the DUD area at the east end all the way to the west end of the atoll at Laura. Both projects involved transfer of considerable land from copra production and the dredging, quarrying and filling of nearby reefs. More recently, a new commercial dock facility was established near DUD. Government jobs and services provide most of Marujo's income.

The years of development and population increases resulted in stagnation and pollution of the lagoon adjacent to the DUD area: Earlier landfilling and residential development in the DUD area was poorly planned, and subsequent tropical storms have caused considerable damage. Remedial work has mandated additional quarrying of reefs for armor rock. Some claim the reef flat quarry holes enhance fishery habitat; others believe that the cumulative effect of construction and crowding has caused a decline in subsistence fishery catch. EPA is presently funding a new ocean sewer outfall off the southest edge of the atoll reef. Coupled with sewage treatment and hook-up to buildings and residents, the wastewater disposal project should eliminate much of the pollution in the eastern lagoon. Solid waste disposal remains a serious problem and landfills have been proposed and developed on reef areas due to the scarcity and high cost of land. The haphazard expansion of the DUD area and maintenance of healthful water and other living conditions in the urban center remain serious problems and challenges. There are plans to increase catchment capacity and improve water quality.

Economic development seems necessary, for an atoll the size of Majuro cannot support a large population on a subsistence basis. The Republic of Nauru has recently invested in upgraded hotel facilities in Majuro, and commercial fishing is also proposed as an income producer. Government support will most likely provide most of Majuro's income as long as it remains a population center and capital of the new Republic of the Marshall Islands.

Kwajalein

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Bikini and Enewetak atolls. Since 1959, Kwajalein has served as a primary site for the research and development of ballistic missile defense systems. Since 1964, the atoll's facility was upgraded to the Kwajalein Missile Range (KMR), presently under Army administration but serving all the armed services (Map 21). Since 1964, KMR has continuously supported a variety of Air Force and Navy test programs for the intercontinental ballistic missile, intermediate range missile, sea-launched ballistic missile, and others.

The KMR includes facilities on Kwajalein Island and on ten outlying islands in the atoll. In 1980, lease agreements with the Kwajalein landowners were in effect for all islands except Roi-Namur and Legan. (I don't have access to more recent data.) As part of the original agreement establishing the KMR, a reentry zone for ballistic missiles, the Mid Atoll Corridor, was designated. This necessitated relocation of islanders living within the corridor and has strained relations between the military and the Kwajalein islanders. Approximately 3,000 United States residents and dependents are stationed on Kwajalein, Roi-Namur, Ennylabegan, and Meck. Unmanned facilities occur on other KMR-controlled islands in the corridor such as Ennugarrett, Gagan, Gellinam, Omelek, Eniwetak, Legan and Illeginni.

The Japanese began to quarry and fill the reefs of Kwajalein after 1935 as they established important naval and air installations there and on Ebeye, Gugeegue, and Roi-Namur Islands. Since 1948, the U.S. Navy and Army have conducted additional and extensive quarrying, dredging and filling, adding 205, 40, and 18 land acres to Kwajalein, Roi-Namur and Meck islands, respectively. Quarry rights have also been obtained for many suitable reefs, and clearing and construction has occurred on most of the KMR-controlled islands. Recently, some of the islands were returned to the Trust Territory government (i.e., Gugeegue, Ningi, North Lol and South Lol).

On one hand, the U.S. Army's operation of the Kwajalein Missile Range is a major source of revenue and employment for Marshall Islanders. On the other hand, there have been physical and socioeconomic impacts caused by dredging, quarrying, filling and clearing, and military operation of the KMR. Many islanders displaced from the Mid Atoll Corridor wish to return and have staged "sail-ins" to protest reduced access to their islands and fishing grounds. There is some question whether such a large corridor is still required in light of advances in the accuracy of guiding and tracking missiles. The Army also objected to the escalating costs of lease rents to use land owned by Kwajalein landowners for the continued operation of the missile range. The Compact may not resolve this dispute if the landowners feel their interests are not being adequately represented.

The United States' decision to reserve Kwajalein Island for U.S. citizens and their dependents has generated resentment from relocated islanders. Marshallese employed by the KMR must commute daily from Ebeye, an island under the control of the Republic of the Marshall Island, three miles from Kwajalein Island. U.S. people residing on Kwajalein enjoy well-maintained grounds, houses, air conditioning, and a variety of services. In contrast, most Marshallese housing on Ebeye just a few miles north and elsewhere is substandard, and equal access to services and facilities is not provided. For years, wages paid to Marshallese were generally lower than wages paid to state-siders for comparable work, but I was unable to determine whether these inequities still exist.

As a consequence of the past decisions, the population on 70-acre Ebeye has steadily grown over the years. In 1950, 550 islanders were reestablished on Ebeye. The population grew to 1,443 by 1961. In 1964, the Army relocated native residents from Kwajalein Island and the Mid Atoll Corridor islands to Ebeye, the population of which is now more than 10,000. Many islanders from outside the atoll and the Marshalls are attracted to Ebeye by job opportunities at KMR. Many others are dependent upon the income provided by the Marshallese KMR workers.

Despite major improvements to housing, sewage, shore protection, docking, water supply and other conditions, health and living standards on Ebeye are poor. The KMR Army command formerly looked to the TTPI (and now to the Republic of the Marshall Islands) for solutions to the Ebeye problem. Others (including the Marshallese) believe the Army should take some responsibility because of its segregationist policies and the employment lure it represents. Thus, while the KMR provides a major source of revenue to workers, Marshallese landowners and the government, it is also a source of serious social unrest and problems. The Kwajalein Development Authority of the emerging Republic of the Marshalls is now in the active planning stages for a causeway project that will connect Ebeye to several small islands to the north. The proponents consider this project, which is subject to a permit from the U.S. Army Corps of Engineers, a way to mitigate crowding and enhance living conditions on Ebeye. If the project is to succeed, land use and residential access to the islands must be carefully controlled to avoid expansion of an existing slum to the newer islands. Development of a coastal resources management plan for the entire atoll to address both the Army's and the Republic's future needs and intentions is clearly warranted. Ratification of the Compact for the

Marshalls will result in an expansion of military construction and testing operations at Kwajalein.

Bikini

Bikini atoll was spared action during World War II, when the small Japanese garrison there committed suicide in 1944. Old newsreels show the islanders to be healthy and happy when first approached by the U.S. military about using their land for nuclear weapons testing (Map 22). Little did they know that acceptance was to make them the "nuclear nomads". The islanders were first moved to uninhabited Rongerik in 1946 but were dissatisfied with the land and the "poisoned" fish in the lagoon. Ujelang was proposed as a suitable substitute, and preliminary preparations were made for its settlement by the Bikinians. But in 1947 the Atomic Energy Commission announced that a second atoll, Enewetak (Eniwetok), would be serving as a nuclear testing ground. The Enewetak people were evacuated to Ujelang on an emergency basis, forcing the Bikinians to remain with inadequate food on Rongerik until 1948. When the authorities finally realized their plight, the islanders were quickly and temporarily moved to Kwajalein. They eventually relocated to Kili, a 230-acre island lacking a lagoon but having a wet climate and more productive land areas than Rongerik. From 1953 to 1956, the island was developed to provide income from copra and handicrafts. Several Bikinian families moved to Jaluit, 30 miles away, and took custody of a schooner to improve water transportation to and from Kili, which lacks any protective harbor or landing.

In 1968, the Atomic Energy Commission announced to President Johnson that Bikini was no longer needed and was safe for rehabilitation. Plans were initiated to clean the atoll, replant coconuts and reconstruct dwellings to allow the Bikinians to resettle their atoll. By 1972, these actions were completed and the Bikinians repatriated to their atoll. Originally, the Bikinians were advised that both Bikini and Eneu, the two large inhabitable islands on the atoll, were safe, but later they were cautioned not to eat coconuts. However, Brookhaven continued to monitor the population. In 1978 whole body radiological examinations revealed that the islanders' radiation counts greatly exceeded recommended safe levels. Bikinians were again evacuated from their atoll on short notice and returned to Kili and Ejit (on Majuro). Since 1978, the Bikinians have acquired legal counsel and have requested independent evaluations of the existing radiological danger at Bikini. When these confirmed the danger, the Bikinians, through their attorney, began to pressure Congress to fund another cleanup. In 1982, Congress authorized funds to establish the Bikini Atoll Rehabilitation

Committee, to independently examine and evaluate cleanup options. After submission of its first full report in late 1984, the Committee was granted two more years of support to develop detailed plans for cleanup and resettlement of the atoll. In conjunction with this effort, I am charged with the responsibility for the environmental studies and impact statement. We are assessing the impacts of past testing, the potential toxicity of fish, and the ability of natural resources to sustain a population of 1,100 Bikinians. We are also identifying cleanup sites and measures and resettlement plans that will have minimum adverse social and environmental impacts. The most likely plan appears to include an early resettlement of Eneu Island followed by physical removal of the soil from Bikini Island and its disposal in the lagoon crater of another island or its use in landfill construction on Bikini Island's shoreline. Other cleanup alternatives include potassium treatment and seawater washing, and their feasibility is being examined by the committee. Either of these two plans would result in less environmental impact. Eneu Island is, and has probably always been, safe for resettlement, and could accommodate 200-300 Bikinians.

Nuclear testing between 1946-1954 destroyed several islands and many reefs at Bikini; dredging and filling associated with the program caused additional damage. BARC environmental studies will continue to assess the extent of physical impacts and the extent of natural recolonization and recovery of ecosystems on Bikini's reefs, lagoons and islands.

Enewetak

After its victories over Japanese forces at Enewetak in 1944, the United States reconstructed the atoll and later designated it as a future nuclear weapons test site. In 1947, 145 islanders comprising two tribes (the dri Engebi and the dri Enewetak) were evacuated to Ujelang atoll (Map 23). Weapons testing was accomplished at Enewetak between 1948 and 1958, mostly within the northeastern quadrant of the atoll. The tests and associated dreding, filling, construction and disposal activities damaged many reef and island ecosystems. Enewetak was thereafter rendered unsafe for habitation. Later, the U.S. military proposed using the atoll's islands and reefs for the PACE Project (Pacific Area Cratering Experiments) designed to simulate the effects of nuclear testing with conventional explosives. This proposal generated considerable controversy and the project was dropped. The earlier cleanup effort at Bikini had also fueled the islanders' interest in cleanup and resettlement of Enewetak. Enewetak was surveyed for radiological and other hazards. In 1974-75 an environmental impact statement regarding the cleanup was circulated by the Defense Nuclear Agency.

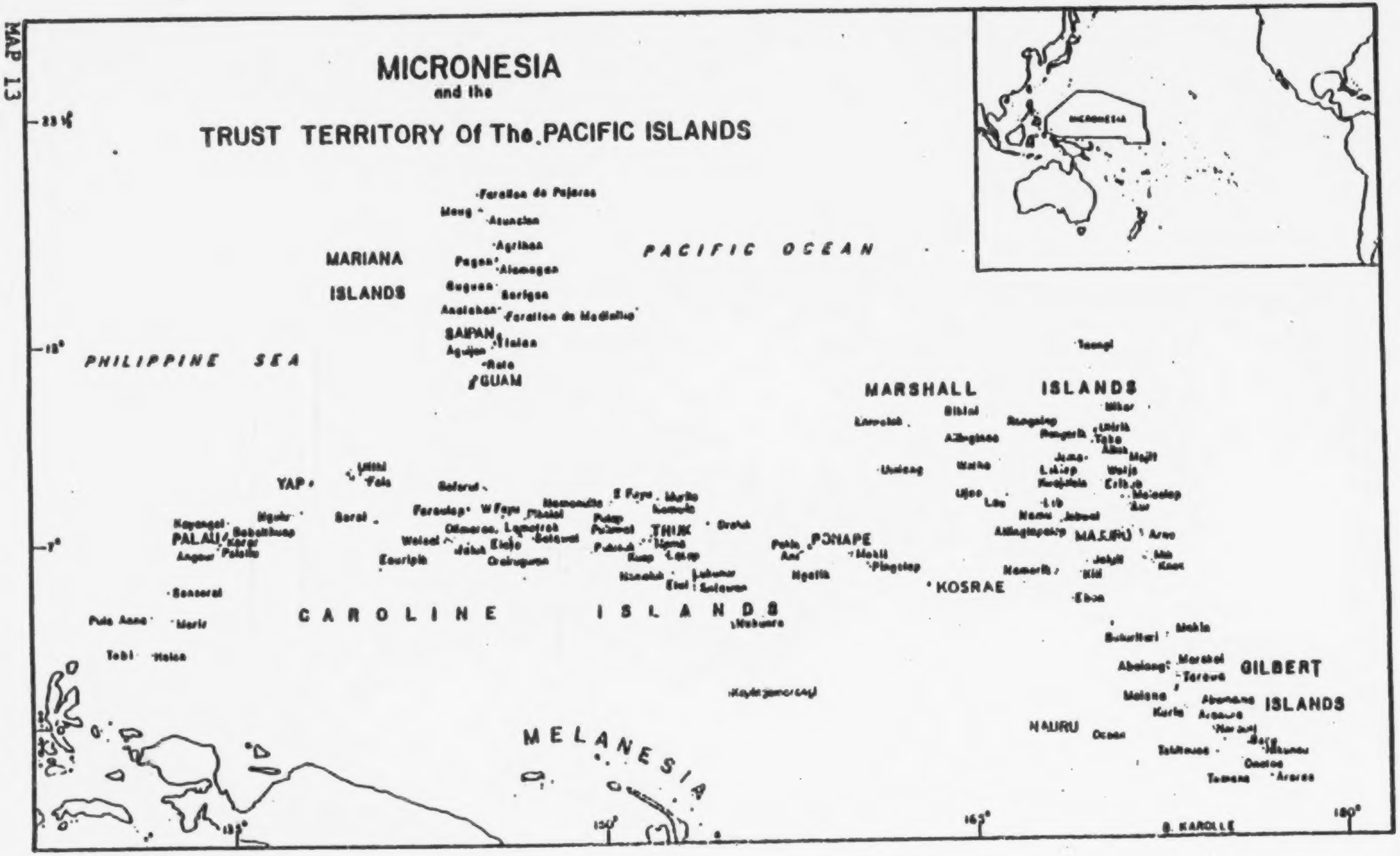
After adjustments responsive to public input and to Corps permit requirements, cleanup began in 1976 and was completed in late 1978. The total effort cost in excess of $100 million. Army troop labor removed contaminated and uncontaminated debris and radiological soil from many islands. Radiological waste was disposed of in a nuclear crater north of Runit island, and the crater was capped with an 18-inch concrete dome. Representatives of the Enewetak people cooperated in the effort to construct dwellings and replant coconut trees. The lagoon still contained radiological hazards after the cleanup, and low-level radioactivity persisted in the soil of several large northern islands in the atoll.

In 1978, the Enewetak islanders were resettled in the southern islands, but many have since left. Inadequate attention was paid to coconut and other crop restoration, and subsistence lifestyles could not be sustained. Resettlement of the northern islands (traditional home of the dri Engebi) was prohibited because of unacceptable levels of radiation in the soil. Recent radiological tests indicate that coconuts from trees replanted in the northern islands may not be fit to eat due to excessive levels of radiation. Thus, the dri Engebi will not be able to live in the northern islands or eat crops grown there for many years.

In retrospect, the cleanup aspects of the Enewetak program were overfunded and emphasized at the expense of meeting resettlement requirements. The use of concrete tremie for disposal of radioactive soil and to cap the crater was much more expensive than other options and may not have been necessary judging from the residual radioactivity still in the lagoon. Perhaps the lessons learned from the previous Enewetak and Bikini cleanups will be useful in the new Bikini cleanup effort now in the planning stages.

The University of Hawaii's Mid Pacific Marine Laboratory operated for nearly three decades at Enewetak, supported by the Atomic Energy Commission and the Department of Energy. Considerable research on atoll geology, ecology, hydrology, biology, and oceanography, as well as documentation of the effects of the nuclear testing program, was conducted at Enewetak. Funding for the lab has since dwindled, and it is not now available to outside researchers.

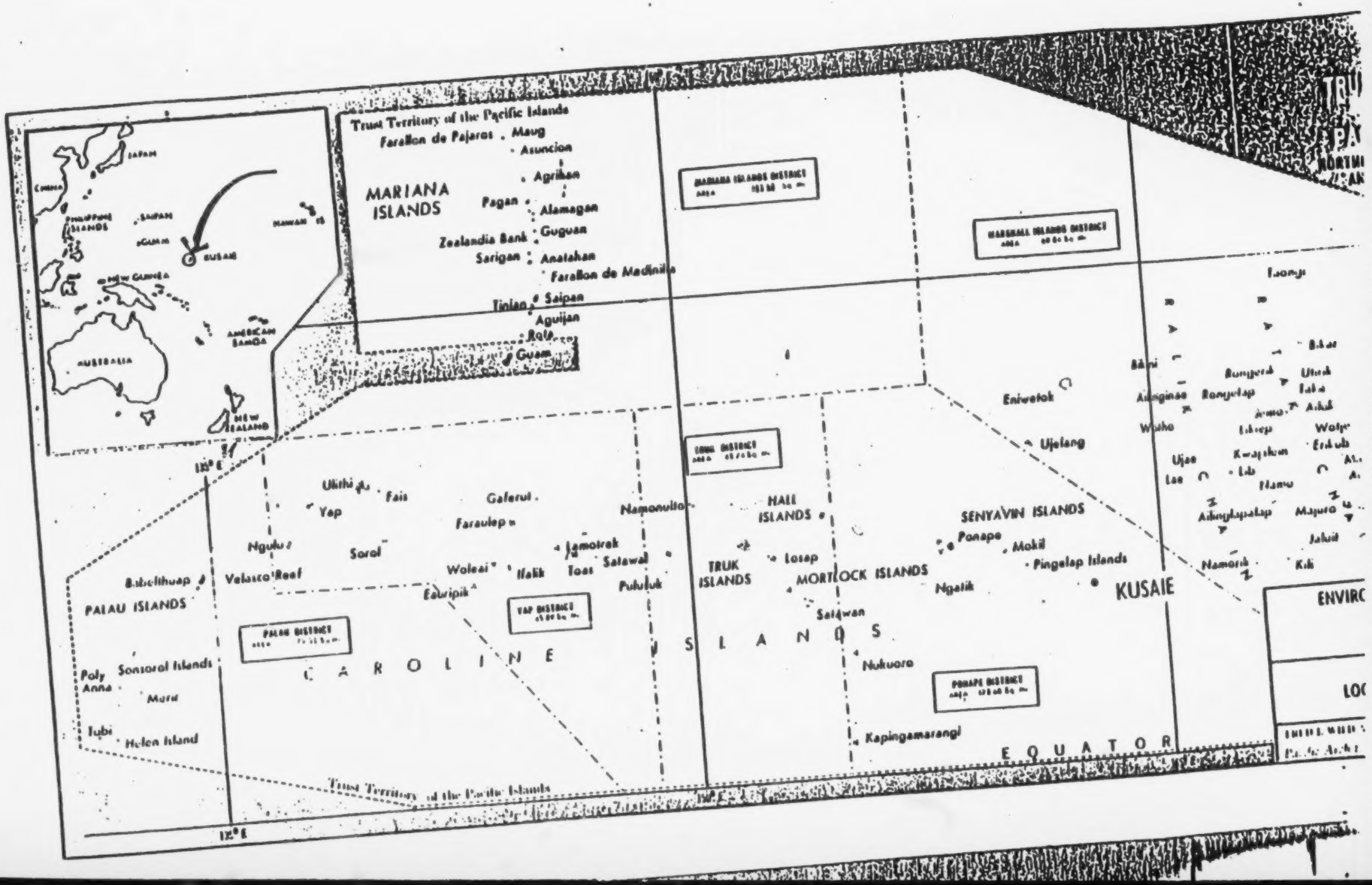
MAP 13

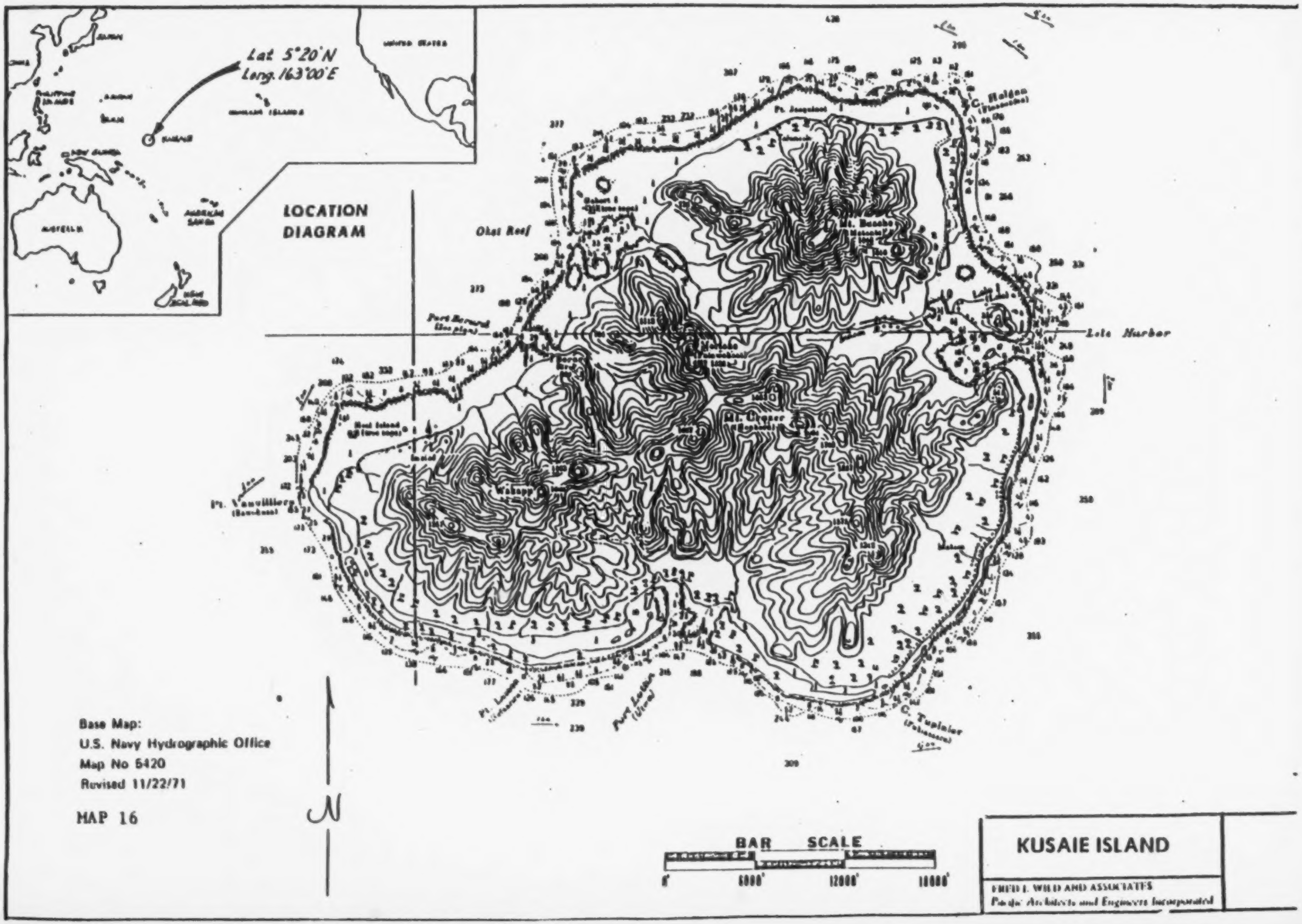


MICRONESIA
and the
TRUST TERRITORY Of The PACIFIC ISLANDS

23½°
15°
7°
135°
150°
165°
180°
PHILIPPINE SEA
PACIFIC OCEAN
MARIANA ISLANDS
Farallon de Pajaros
Maug
Asuncion
Agrihan
Pagan
Alamagan
Guguan
Sarigan
Anatahan
Farallon de Medinilla
SAIPAN
Tinian
Aguijan
Rota
GUAM
CAROLINE ISLANDS
YAP
Ulithi
Fais
Sorol
Ngulu
Kayangel
PALAU
Babelthuap
Koror
Peleliu
Angaur
Sonsorol
Pulo Anna
Merir
Tobi
Helen
Satawal
Faraulep
W Fayu
Pikelot
Lamotrek
Elato
Woleai
Ifalik
Eauripik
Olimarao
Namonuito
E Fayu
Murilo
Nomwin
Pulap
Pulusuk
Puluwat
TRUK
Losap
Nama
Namoluk
Etal
Lukunor
Satawan
Oroluk
Pakin
Ant
PONAPE
Mokil
Pingelap
Ngatik
Nukuoro
Kapingamarangi
KOSRAE
MARSHALL ISLANDS
Taongi
Bikini
Eniwetok
Rongelap
Rongerik
Ailinginae
Utirik
Taka
Bikar
Ailuk
Mejit
Ujelang
Wotho
Likiep
Jemo
Kwajalein
Wotje
Erikub
Maloelap
Aur
Ujae
Lae
Lib
Namu
Jabwot
Ailinglapalap
MAJURO
Arno
Jaluit
Mili
Knox
Namorik
Kili
Ebon
GILBERT ISLANDS
Butaritari
Makin
Abaiang
Marakei
Tarawa
Maiana
Kuria
Abemama
Aranuka
Nonouti
Tabiteuea
Beru
Nikunau
Onotoa
Tamana
Arorae
NAURU
Ocean
MELANESIA
MICRONESIA
B. KAROLLE

MAP 14


Trust Territory of the Pacific Islands
JAPAN
CHINA
PHILIPPINE ISLANDS
SAIPAN
GUAM
KUSAIE
HAWAIIAN IS
NEW GUINEA
AUSTRALIA
AMERICAN SAMOA
NEW ZEALAND
MARIANA ISLANDS
Farallon de Pajaros
Maug
Asuncion
Agrihan
Pagan
Alamagan
Zealandia Bank
Guguan
Sarigan
Anatahan
Farallon de Medinilla
Tinian
Saipan
Aguijan
Rota
Guam
MARIANA ISLANDS DISTRICT
MARSHALL ISLANDS DISTRICT
TRUK DISTRICT
YAP DISTRICT
PALAU DISTRICT
PONAPE DISTRICT
Eniwetok
Ujelang
Bikini
Ailinginae
Rongelap
Rongerik
Utirik
Taka
Ailuk
Wotho
Likiep
Wotje
Erikub
Ujae
Lae
Kwajalein
Lib
Namu
Ailinglapalap
Majuro
Jaluit
Namorik
Kili
Bikar
Taongi
Ulithi
Fais
Yap
Gaferut
Faraulep
Ngulu
Sorol
Woleai
Ifalik
Eauripik
Lamotrek
Satawal
Pulusuk
Namonuito
HALL ISLANDS
TRUK ISLANDS
Losap
MORTLOCK ISLANDS
Satawan
SENYAVIN ISLANDS
Ponape
Mokil
Pingelap Islands
Ngatik
KUSAIE
Nukuoro
Kapingamarangi
Babelthuap
Velasco Reef
PALAU ISLANDS
Sonsorol Islands
Poly Anna
Merir
Tobi
Helen Island
CAROLINE ISLANDS
EQUATOR
ENVIRO
LO
Trust Territory of the Pacific Islands
130° E
130° E
TRU
PA
NORTH


Lat 5°20'N
Long. 163°00'E
LOCATION DIAGRAM
Okat Reef
Port Berard
Pt. Jacquinot
C. Holgon
Mt. Buache
Lele Harbor
Mt. Crozer
Wakapp
Pt. Vauvilliers
Pt. Lesson
Port Lottin (Utwa)
C. Tupinier
N
BAR SCALE
0
6000'
12000'
18000'

Base Map:
U.S. Navy Hydrographic Office
Map No 6420
Revised 11/22/71

MAP 16

KUSAIE ISLAND

FRED L. WILD AND ASSOCIATES
Pacific Architects and Engineers Incorporated

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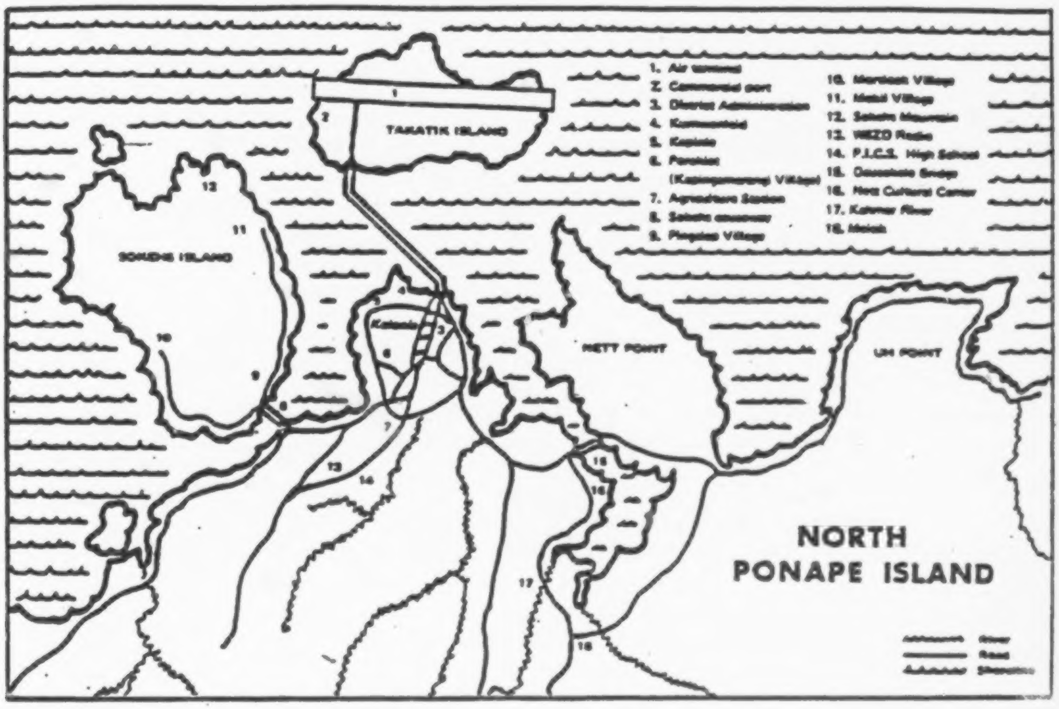
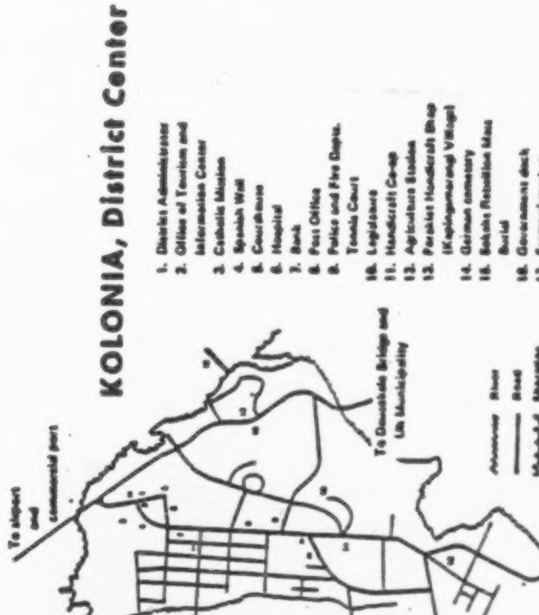

NORTH PONAPE ISLAND
TAKATIK ISLAND
SOKEHS ISLAND
Kolonia
NETT POINT
UH POINT
1. Air terminal
2. Commercial port
3. District Administration
6. Porakiet (Kapingamarangi Village)
7. Agriculture Station
8. Sokehs causeway
9. Pingelap Village
12. Sokehs Mountain
13. WSZD Radio
14. P.I.C.S. High School
15. Dausokele Bridge
River
Road
Shoreline

Maps by Mike Ashman

MAP 17

PONAPE DISTRICT


KOLONIA, District Center
1. District Administrator
2. Office of Tourism and Information Center
3. Catholic Mission
4. Spanish Wall
5. Courthouse
6. Hospital
7. Bank
8. Post Office
9. Police and Fire Depts.
Tennis Court
10. Legislature
11. Handicraft Co-op
12. Agriculture Station
13. Porakiet Handicraft Shop (Kapingamarangi Village)
14. German cemetery
15. Sokehs Rebellion Mass Burial
16. Government dock
17. Farmers' market
18. Protestant Church
River
Road
Shoreline
H Hotel
To airport and commercial port
To Dausokele Bridge and Uh Municipality
To PICS High School
To Nan Pohnmal and Communications Station
To Sokehs Island

PONAPE ISLAND

134

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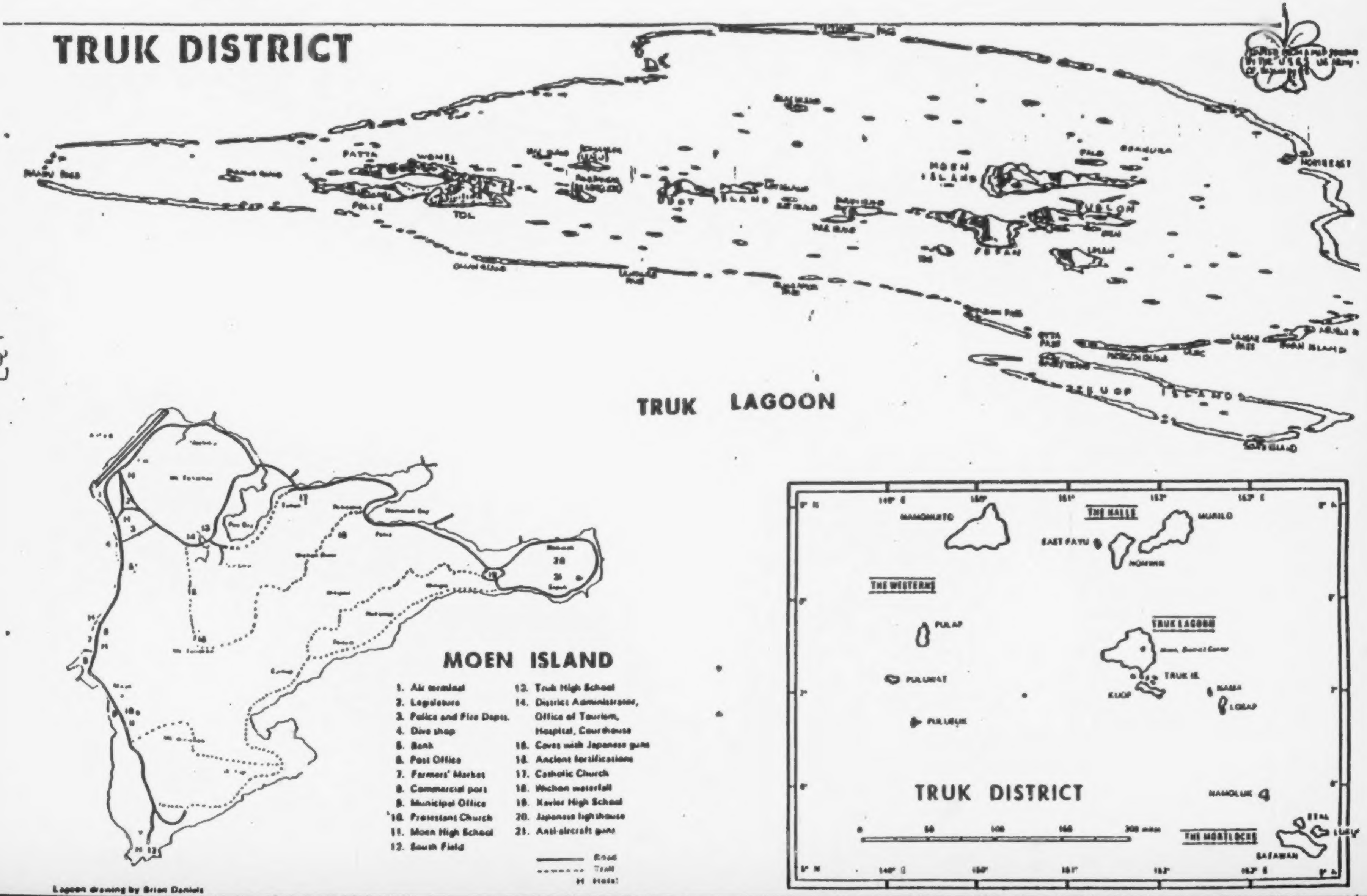
MAP 18A


TRUK DISTRICT
PATTA
TOL
POLLE
MOEN ISLAND
DUBLON
FEFAN
UMAN
TRUK LAGOON
MOEN ISLAND
1. Air terminal
2. Legislature
3. Police and Fire Depts.
4. Dive shop
5. Bank
6. Post Office
7. Farmers' Market
8. Commercial port
9. Municipal Office
10. Protestant Church
11. Moen High School
12. South Field
13. Truk High School
14. District Administrator, Office of Tourism, Hospital, Courthouse
15. Caves with Japanese guns
16. Ancient fortifications
17. Catholic Church
18. Wichen waterfall
19. Xavier High School
20. Japanese lighthouse
21. Anti-aircraft guns
Road
Trail
H Hotel
TRUK DISTRICT
THE HALLS
MURILO
NAMONUITO
EAST FAYU
NOMWIN
THE WESTERNS
PULAP
PULUWAT
PULUSUK
TRUK LAGOON
Moen, District Center
TRUK IS.
KUOP
NAMA
LOSAP
NAMOLUK
ETAL
LUKUNOR
SATAWAN
THE MORTLOCKS
0
50
100
150
200 miles
149° E
150°
151°
152°
153° E

Lagoon drawing by Brian Daniels

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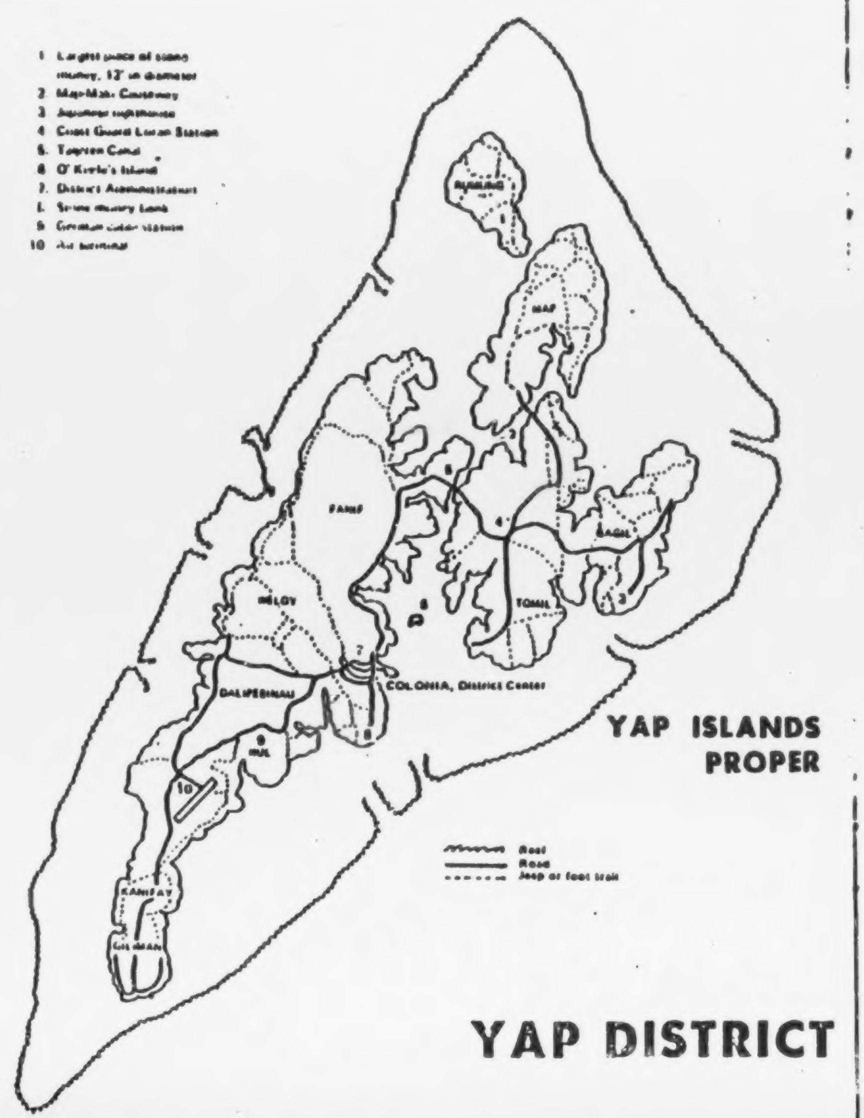
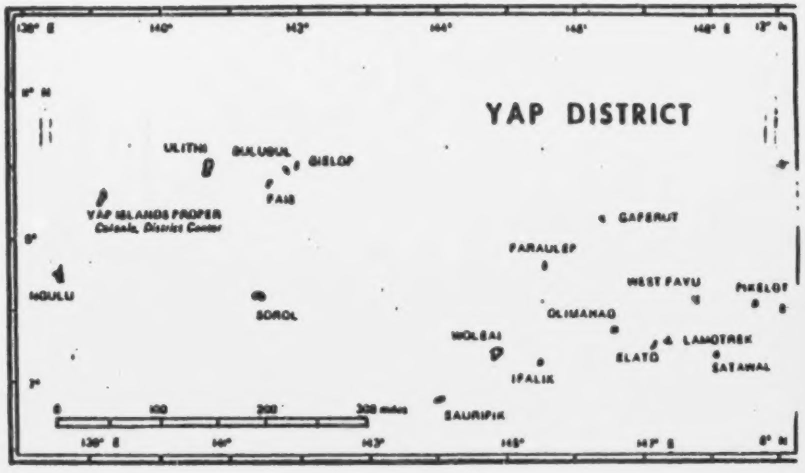
MAP 18B


RUMUNG
MAP
GAGIL
TOMIL
FANIF
WELOY
DALIPEBINAU
RULL
KANIFAY
GILMAN
COLONIA, District Center
Reef
Road
Jeep or foot trail

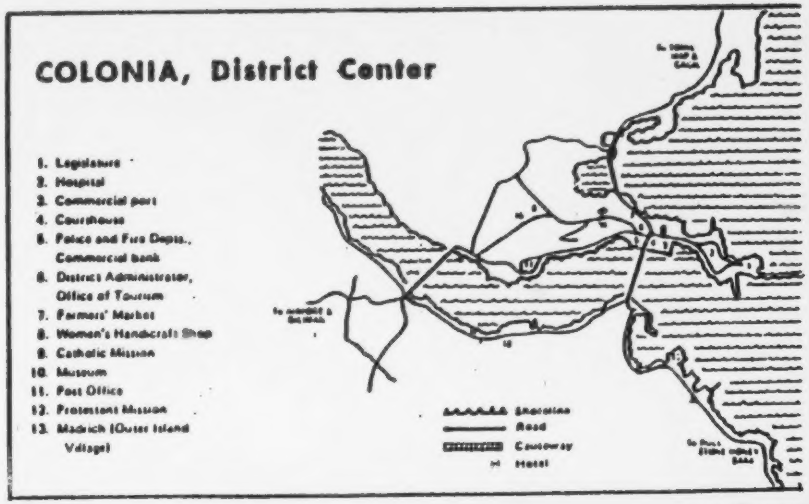
1 Largest piece of stone money, 12' in diameter
2 Map-Mak Causeway
3 Japanese lighthouse
4 Coast Guard Loran Station
5 Tagreng Canal
6 O'Keefe's Island
7 District Administration
8 Stone money bank
9 German cable station
10 Air terminal

YAP ISLANDS PROPER

YAP DISTRICT


YAP DISTRICT
138° E
140°
142°
144°
146°
148° E
12° N
10° N
8°
7°
6° N
ULITHI
SULUBUL
GIELOP
FAIS
YAP ISLANDS PROPER
Colonia, District Center
NGULU
SOROL
GAFERUT
FARAULEP
WEST FAYU
PIKELOT
OLIMARAO
WOLEAI
IFALIK
ELATO
LAMOTREK
SATAWAL
SAURIPIK
0
100
200
300 miles

COLONIA, District Center


Shoreline
Road
Causeway
Hotel

1. Legislature
2. Hospital
3. Commercial port
4. Courthouse
5. Police and Fire Depts., Commercial bank
6. District Administrator, Office of Tourism
7. Farmers' Market
8. Women's Handicraft Shop
9. Catholic Mission
10. Museum
11. Post Office
12. Protestant Mission
13. Madrich (Outer Island Village)

Maps by Mike Ashmer

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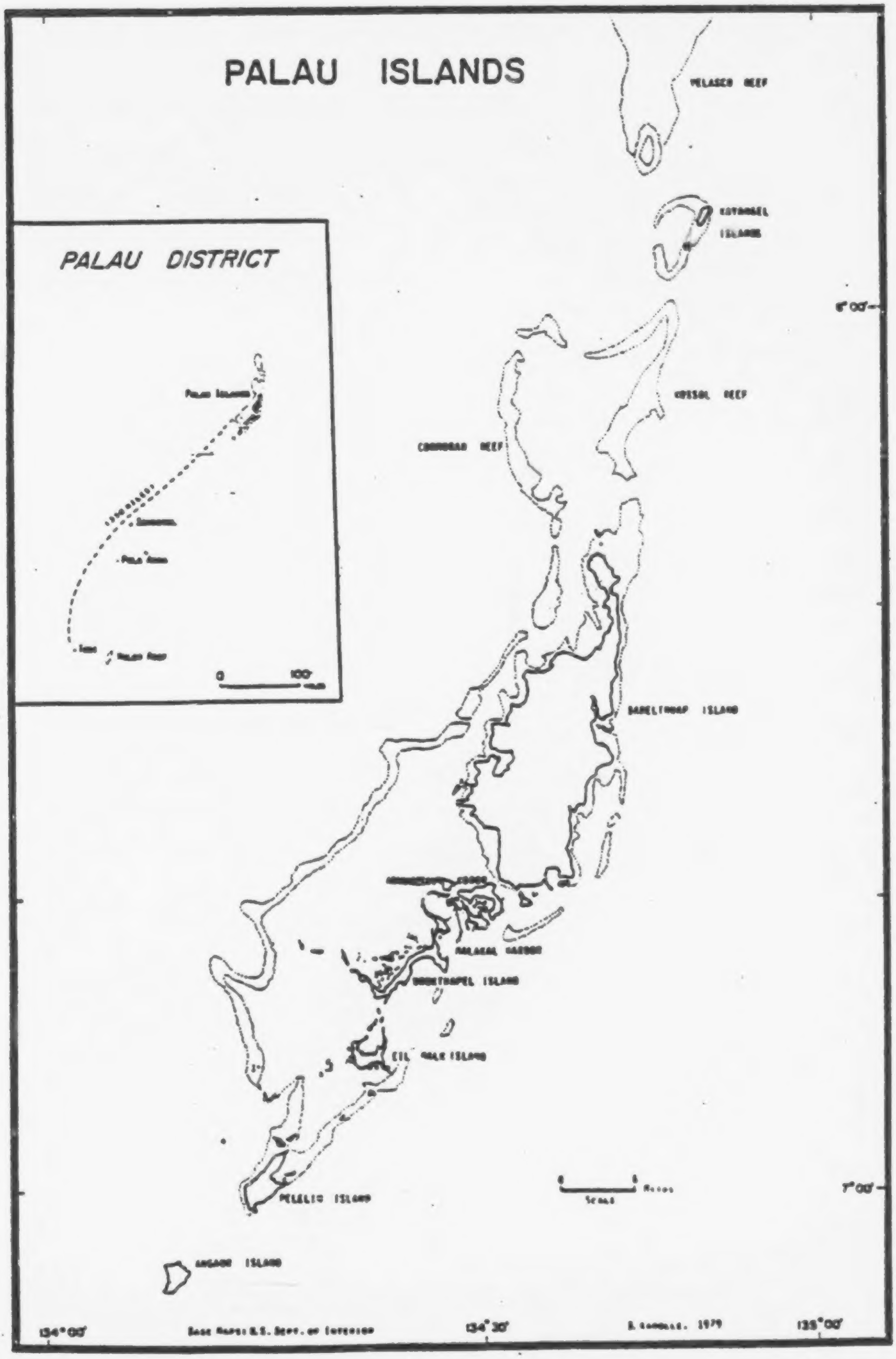
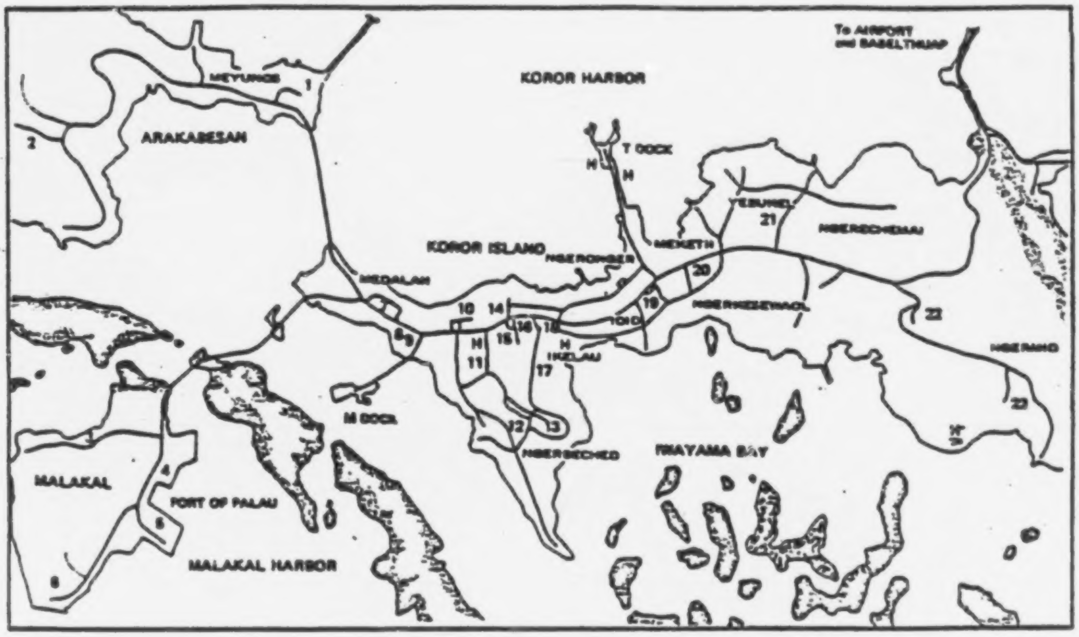
MAP 19


PALAU ISLANDS
PALAU DISTRICT
PALAU ISLANDS
SONSOROL
PULO ANNA
TOBI
HELEN REEF
0
100
MILES
VELASCO REEF
KAYANGEL ISLANDS
8°00'
KOSSOL REEF
BABELTHUAP ISLAND
MALAKAL HARBOR
URUKTHAPEL ISLAND
EIL MALK ISLAND
PELELIU ISLAND
ANGAUR ISLAND
0
5
MILES
SCALE
7°00'
134°00'
BASE MAPS: U.S. DEPT. OF INTERIOR
134°30'
1979
135°00'


To AIRPORT and BABELTHUAP
KOROR HARBOR
MEYUNGS
1
2
ARAKABESAN
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NGEREMLENGUI? NGEROMBER
MEKETII
ESUNEL
21
NGERCHEMAI
20
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MEDALAII
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14
16
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18
TOID
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NGERMID
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9
H
11
H
IKELAU
17
M DOCK
12
13
NGERBECHED
IWAYAMA BAY
23
MALAKAL
4
PORT OF PALAU
5
6
MALAKAL HARBOR

Maps by Nicolas C. Guerrero and Mike Ashman

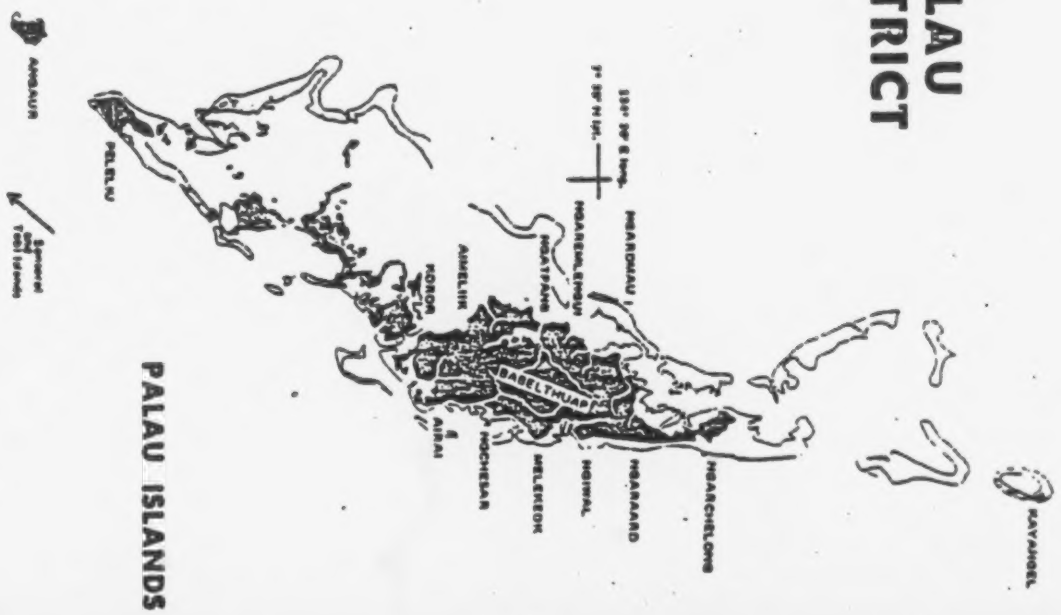
MAP 20

KOROR, District Center

1. District Administrator, Office of Tourism
2. Road to [illegible] Seaplane Ramps
3. Boatyard
4. Fisheries, freezer plant
5. Commercial port
6. Malakal Lookout
7. Agriculture Station
8. Bank
9. Courthouse
10. High School
11. Hospital
12. Museum and Abai
13. Biology Laboratory
14. Micronesian Occup. Center
15. Police and Fire Depts.
16. Legislature
17. SDA Church and School
18. Post Office
19. Municipal Office
20. Catholic Mission, School
21. Protestant Church
22. Gun emplacement
23. Japanese shrine

H HOTEL

PALAU DISTRICT


KAYANGEL
NGARCHELONG
NGARAARD
NGARDMAU
134° 30' E long.
7° 30' N lat.
NGAREMLENGUI
NGIWAL
NGATPANG
BABELTHUAP
MELEKEOK
NGCHESAR
AIMELIIK
AIRAI
KOROR
PALAU ISLANDS
PELELIU
ANGAUR
Sonsorol and Tobi Islands

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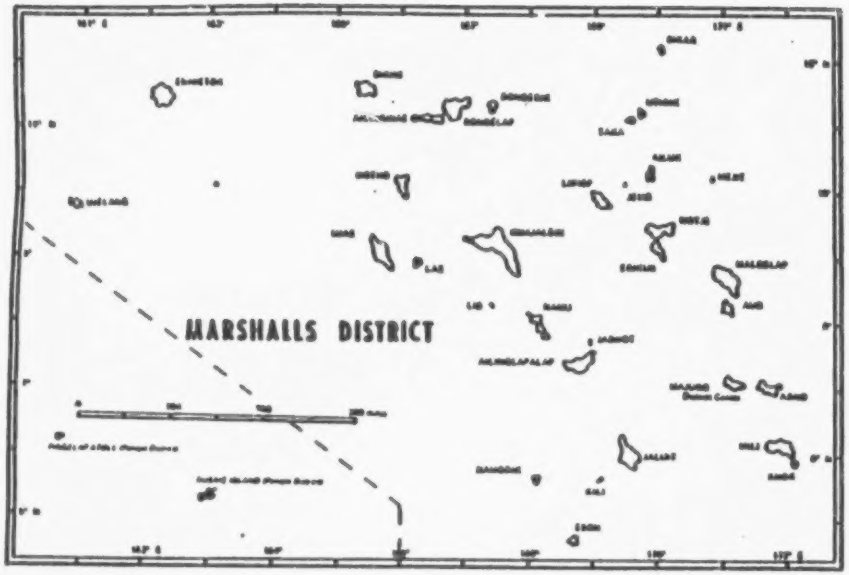
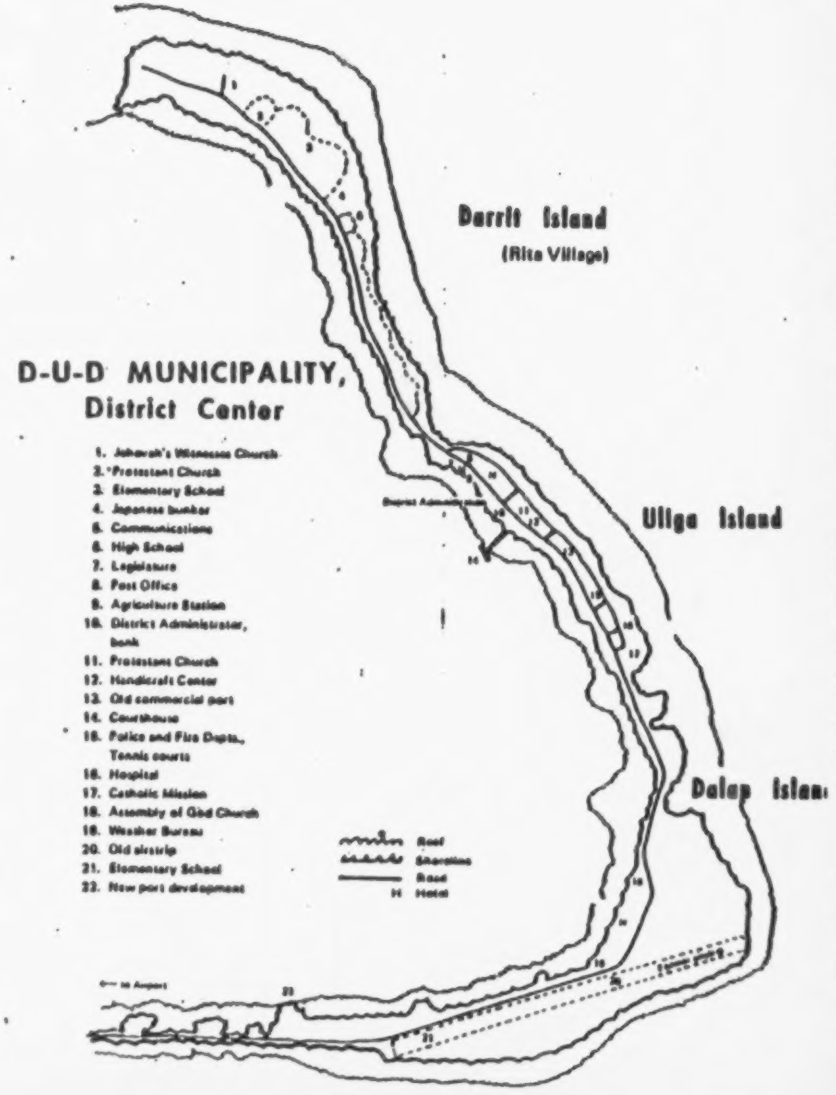
MAP 15

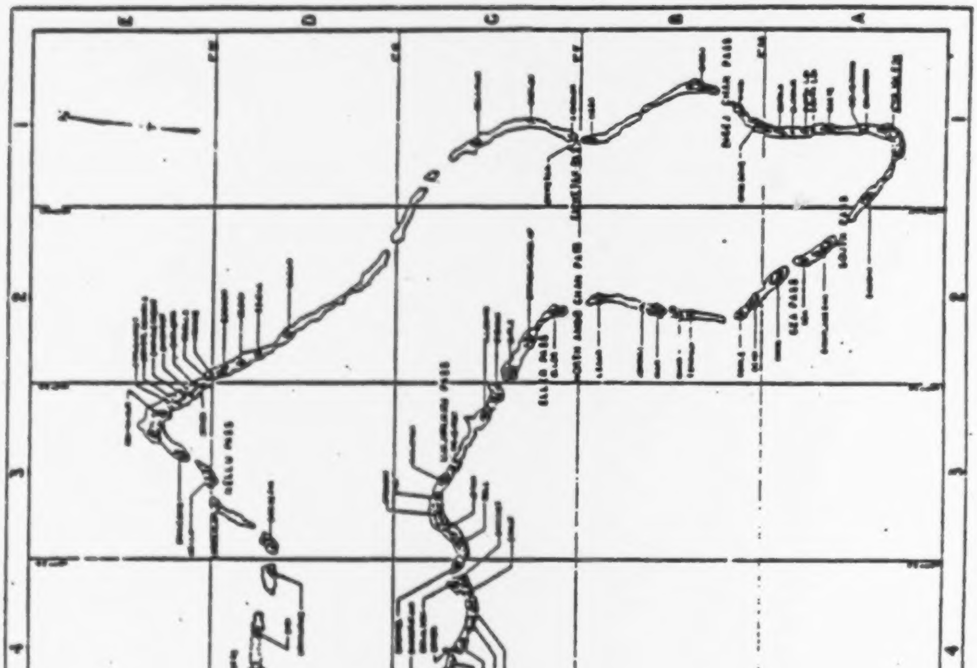

MARSHALLS DISTRICT

MARSHALL ISLANDS DISTRICT

MAJURO ATOLL

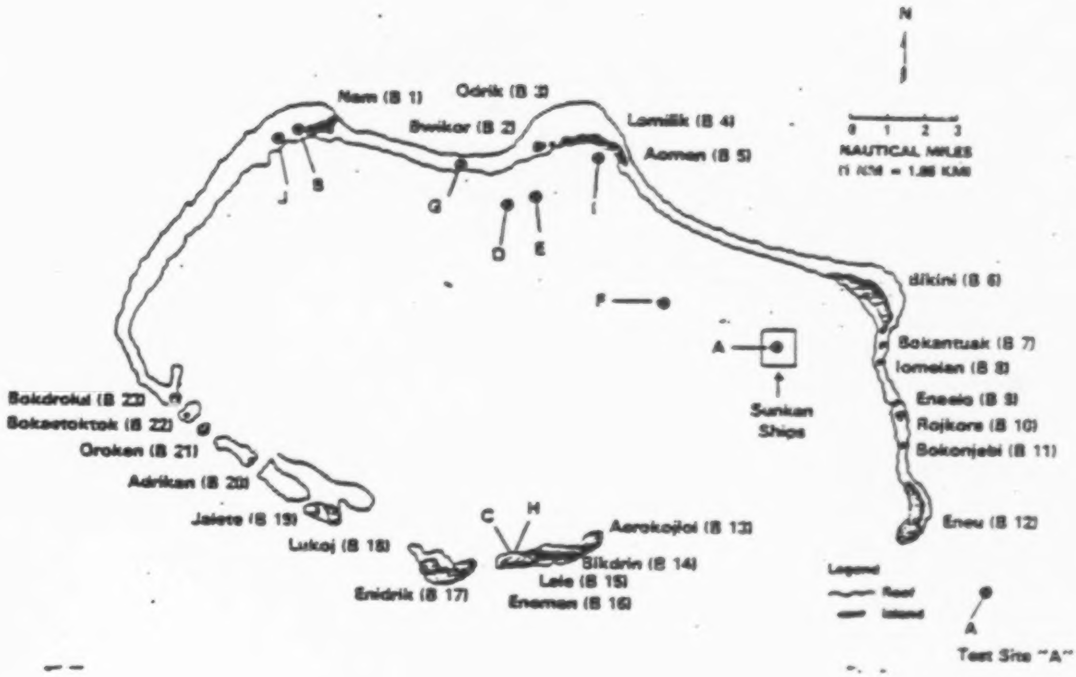

D-U-D MUNICIPALITY,
District Center
1. Jehovah's Witnesses Church
2. Protestant Church
3. Elementary School
4. Japanese bunker
5. Communications
6. High School
7. Legislature
8. Post Office
9. Agriculture Station
10. District Administrator, bank
11. Protestant Church
12. Handicraft Center
13. Old commercial port
14. Courthouse
15. Police and Fire Depts., Tennis courts
16. Hospital
17. Catholic Mission
18. Assembly of God Church
19. Weather Bureau
20. Old airstrip
21. Elementary School
22. New port development
Reef
Shoreline
Road
H Hotel
Darrit Island
(Rita Village)
Uliga Island
Dalap Islan

MAP 21


KWAJALEIN ATOLL
KWAJALEIN ISLAND

MAP OF KWAJALEIN ATOLL

MAP 22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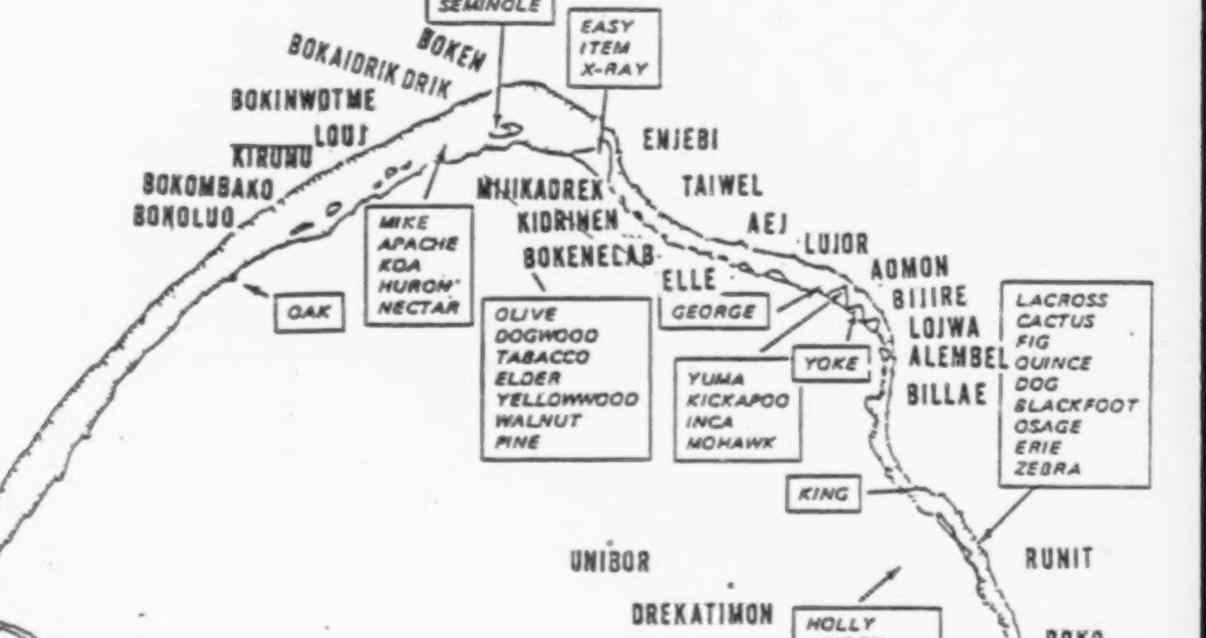
NAUTICAL MILES
(1 NM = 1.85 KM)
Nam (B 1)
Odrik (B 3)
Bwikor (B 2)
Lomilik (B 4)
Aoman (B 5)
J
B
G
D
E
I
Bikini (B 6)
F
A
Sunken Ships
Bokantuak (B 7)
Iomelan (B 8)
Eneelo (B 9)
Rojkora (B 10)
Bokonjebi (B 11)
Eneu (B 12)
C
H
Aerokojlol (B 13)
Bikdrin (B 14)
Lele (B 15)
Enemon (B 16)
Enidrik (B 17)
Lukoj (B 18)
Jelete (B 19)
Adrikan (B 20)
Oroken (B 21)
Bokaetoktok (B 22)
Bokdrolul (B 23)
Legend
Reef
Island
A
Test Site "A"

a. W. R. Schell, F. G. Lowman, and R. P. Marshall, "Geochemistry of Transuranic Elements at Bikini Atoll." Transuranic Elements In the Environment, W. C. Hanson, Ed., DOE, DOE/TIC-22800, 1980.

Approximate Locations of Nuclear Tests at Bikini Atoll[a]


SEMINOLE
EASY
ITEM
X-RAY
BOKEN
BOKAIDRIK DRIK
BOKINWOTME
LOUJ
KIRUNU
ENJEBI
BOKOMBAKO
BOKOLUO
MIIIKADREX
TAIWEL
KIDRINEN
MIKE
APACHE
KOA
HURON
NECTAR
AEJ
LUJOR
BOKENELAB
ELLE
AOMON
OAK
GEORGE
BIJIRE
LOJWA
ALEMBEL
BILLAE
OLIVE
DOGWOOD
TABACCO
ELDER
YELLOWWOOD
WALNUT
PINE
YOKE
YUMA
KICKAPOO
INCA
MOHAWK
LACROSS
CACTUS
FIG
QUINCE
DOG
BLACKFOOT
OSAGE
ERIE
ZEBRA
KING
RUNIT
UNIBOR
DREKATIMON
HOLLY
LINDEN
SEQUOIA
BUTTERNUT
ROSE
MAGNOLIA
SCAEVOLA
PISONIA
MUNJOR
BOKO
INEDRAL
VAN
JINEDROL
ANANIJ
BIKEN
JINIMI
JEDROL
JAPTAN
MEDREN
KIDRENEN
UMBRELLA
RIBEWON
BOKEN
MUT
IKUREN
BOKANDRETOK
ENEWETAK
WAHOO

MAP 23

ENEWETAK ATOLL - TEST LOCATIONS

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OTHER U.S. ISLAND POSSESSIONS IN THE TROPICAL PACIFIC

Included in this category are isolated and unincorporated islands and reefs under U.S. control and sovereignty in the tropical Pacific basin.

Howland, Jarvis, and Baker are three arid coral islands in the southern Line Island group (Map 8). All were used as weather stations and military outposts during the World War II years, and all are now National Wildlife Refuges administered by the U.S. Fish and Wildlife Service. The continued designation of these islands and Rose Atoll as refuges is probably most appropriate. The U.S. Army Corps of Engineers is presently investigating whether to clean up debris, drums, and discarded fuel from the islands as part of its responsibilities under the new Defense Environmental Restoration Account.

This leaves only Kingman Reef, Palmyra Atoll and Johnston Atoll in the northern Line Islands; Midway Atoll at the northwest end of the Hawaiian archipelago; and Wake Atoll, north of Marshall Islands (Map 8). Kingman Reef has land area exposed only at low tide, and is essentially a coral reef and shoal, presently under the jurisdiction of the U.S. Navy.

Midway Atoll

Midway Atoll (177'W longitude, 127'N latitude) is near the northwest end of the Hawaiian Archipelago and consists of two main islands, Sand and Eastern, and surrounding reefs (Map 9). The atoll has been the site of many groundings and shipwrecks. It was discovered by Captain N. C. Brooks of Hawaii in 1859. There is no evidence of previous human occupation. In 1867, Captain W. Reynolds of the U.S. Navy claimed it for the United States which later annexed it and made an unsuccessful attempt to dredge a channel and safe anchorage on its west side. The slaughter of Midway's seabirds by plume and feather hunters led the government to designate the Leeward Hawaiian Islands, including Midway, as part of a National Wildlife Refuge. In 1903, a link of the Commercial Pacific Cable Station was constructed on Midway as a part of the first global communication system. Later, Pan American World Airways established a seaplane base there to complete a trans-Pacific route between San Francisco and Manila. Flights were inaugurated in 1935. Still later, a quarantine station was established at Midway to control the introduction of exotic and pest species to Hawaii.

On December 7, 1941, the Japanese bombed Midway on their return from Pearl Harbor, and in June 1942 attempted to secure the atoll in a bloody air and sea battle. The American victory at Midway was a turning point in the war and prevented the Japanese from broadening their control of the Pacific. A number of historic sites and monuments on Midway are reminders of this history. The Navy now maintains a Naval Air Station at Midway, including airfields, and a deep draft harbor.

Midway's most important natural resources are large populations of nesting and migratory seabirds and shorebirds, especially terns and albatrosses; at times, the bird population approaches one million; over 60 species have been recorded. Both the Navy and the Fish and Wildlife Service are actively involved in seabird conservation programs as a part of refuge management. Fishery and coral reef resources have also been studied in recent years, and for a short time commercial fishing interests were allowed access to the island for refueling. The endangered Hawaiian monk seal is Midway's most important marine mammal but has been very sensitive to human presence and disturbance. Other rare species include the short-tailed albatross, the green sea turtle and possibly the hawksbill sea turtle.

Significant environmental issues include the high seabird mortality (due to collisions with planes and radio antennae); and the continued vulnerability of monk seal populations. Over the years, seal population levels have declined both at Midway and other islands in the Leeward chain. It is important to reestablish prime pupping habitat and minimize disturbance if populations are to recover. A third issue is the continued incidence of fish poisoning at Midway. It has been theorized that ciguatera poisoning results from disturbances to reef environments (i.e., dredging and filling). Recent dredging at Midway may cause another outbreak of poisoning.

I recommend maintaining Midway's present status as a fish and wildlife refuge, improving habitat and recovery of monk seal populations; and working to reduce collisions between birds and airplanes and antennae. The Navy should continue to manage the atoll. Commercial fishing should be discouraged due to potential disturbance to rare and important fish and wildlife at Midway and nearby islands within the National Wildlife Refuge.

Wake Atoll

Wake is an isolated atoll north of the Marshall Islands (167'E longitude, 19'N latitude). It consists of three islets and a reef-enclosed shallow lagoon (Map 10). The written historical record provides no evidence of prehistoric occupation or colonization of Wake. Marshall islanders occasionally visit Wake, have given it a Marshallese name (Enenkio), and also occasionally claim it. A Spaniard, Alvaro de Mendana, discovered the atoll in

1568, and in 1796 Captain Wake visited the island in a British schooner. Early explorers and visitors largely ignored Wake until the United States claimed the atoll in 1898, taking possession in the following year. Until the 1930s, the only visitors to uninhabited Wake were scientists and shipwrecked sailors. In 1935, Pan American World Airways established a seaplane base, hotel and support facilities in preparation for trans-Pacific flights. In 1934, the Navy received administrative control of the island and in 1941 set up an air base there.

The battle of Wake was perhaps the atoll's most important historical event. The Japanese first bombed Wake on December 7, 1941 on return from Pearl Harbor, and on December 23 invaded and took control of Wake after heavy fighting. Wake never again figured prominently in the war, its strategic importance effectively neutralized by continuous and heavy U.S. bombardment. Japanese occupying forces became virtual prisoners on the atoll. The United States reoccupied Wake after the war, and the Federal Aviation Administration administered the atoll from 1947 to 1962, when administrative responsibility transferred to the Department of Interior. Civilian administration of the atoll was then assigned to the U.S. Air Force, which still controls Wake.

Significant coastal resources at Wake include nesting seabird populations and coral reefs. Periodic storms have affected the atoll's geomorphology considerably. The lagoon is very shallow, with a maximum depth of 15 feet. Both these factors, plus the atoll's small size, tend to limit coral development and diversity. The green sea turtle and the hawksbill turtle may occasionally visit Wake to feed, but there has been no documented nesting activity.

Seabird populations at Wake were severely decimated during the Japanese occupation, but are now protected. An endemic bird, the Wake rail (Rallus wakensis) became extinct during the same time period. The only other rare species at Wake is a plant Lepidium wahiense which the U.S. Fish and Wildlife Service considers a candidate for proposed listing as an endangered species.

There are no significant resource management problems at Wake, but past damage from port dredging and filling, bombardment, has been extensive as has denudation of wildlife and vegetation during the war occupation years. The oil ship Stoner ran aground causing a major oil spill and damage to reefs in 1970. By 1979, partial recovery of reefs was evident. Such major disturbances to the environment argue against establishing larger wildlife refuges there.

Palymra Atoll

Palmyra is a "wet" atoll near the northwest end of the Line Islands with three sub lagoons and over 50 separate islets totaling some 1,800 acres in the central Pacific (162°W longitude, 6°N latitude), 1,000 miles south of Hawaii (Map 11). Palmyra was discovered in 1802 by Captain Sawle, and in 1859, Gerritt Judd of the American Guano Company claimed the island for the company. In 1862, Palmyra officially became a part of the Hawaiian Kingdom, and in 1911 Judge Henry Cooper of Honolulu acquired the island. When Hawaii became a U.S. territory in 1899, Palmyra was officially included. In 1922, all land titles (except those for a few small islands at Palmyra) were transferred to the Fullard-Leo family of Honolulu which still owns the atoll. There is no direct evidence of prehistoric occupation of Palmyra. The presence of coconut trees on the atoll and of cultural deposits and a Polynesian marae or ceremonial platform (with a radiocarbon date of AD 400) on nearby Fanning Atoll indicate the early Polynesians resided on Fanning and may have resided or visited Palmyra.

In preparation for possible war, the U.S. Navy surveyed the atoll in 1938 and constructed a seaplane base and other defense facilities. The Japanese bombed Palmyra on December 23, 1941, but it saw no further action during World War II. The atoll was continuously occupied by Navy or other federal installations until 1949. It was temporarily occupied during nuclear testing programs in 1962. Palmyra was explicitly excluded from the Hawaii Statehood Act of 1960 and has been only intermittently occupied during the past two and one-half decades. A legal decision by the U.S. Supreme Court returned Palmyra to its present owners after a protracted effort by the U.S. Navy to retain control of the atoll.

Palmyra has a wet equatorial climate and vegetation including Cocos, Pisonia, Messerschmidia, Neisosperma (=Ochrosia), Asplenium and other plants is lush. A variety of seabirds nest there. Land crabs, coconut crabs and other crabs are also common. The marine biota has been only partially sampled, but large populations of fish occur in the lagoon, including mullet, goatfish, jacks, and surgeonfish. The lagoon is brackish and estuarine. During military occupation, ciguatera fish poisoning was a problem at Palmyra, possibly as a consequence of heavy dredging and filling activities. No recent data on this problem are available. Nevertheless, construction activity has resulted in major impacts to reefs and lagoon environments. They have only partially recovered. Palmyra could be considered as a wildlife refuge and marine sanctuary on the basis of its wet climate, unique to atolls and islands under U.S. possession in the Pacific.

Palmyra's potential for economic development and natural resource conservation is considerable. Its owners and previous lessees have attempted to develop the atoll for copra production and aquaculture. Palmyra also shows promise for commercial fishing, sport fishing, tourism, as a refueling stop for air traffic, and as a resettlement site for Pacific islanders displaced by storms, overpopulation, nuclear weapons testing, etc. In 1979, the U.S. Departments of State and Energy proposed that Palmyra become the proposed site for temporary storage of spent nuclear fuel from the Far East. However, considerable public controversy and the owner's strong objections nixed this plan.

Palmyra's private ownership limits federal jurisdiction. However, debris from military and federal occupation of Palmyra still litters the atoll. The Defense Environmental Restoration Account offers one source of cleanup funds, and the U.S. Army Corps of Engineers may be investigating a cleanup of the atoll soon.

Johnston Atoll

Johnston is an open atoll in the north central Pacific (16'45'N latitude, 169'30'E longitude) approximately 800 miles southwest of Honolulu (Map 12). The atoll platform and lagoon measure about 15 miles east-west and 7 miles north-south. The atoll's islands and most shallow reefs are found in its northwestern quadrant while the southeastern quadrant is deeper. Until the 1940s, the atoll had only two islands, Johnston Island (60 acres) and Sand Island (10 acres). By 1964, massive dredge and fill operations had expanded Johnston Island to over 600 acres, doubled the size of Sand Island, and created two rectangular fill islands, Akau and Hikina, of approximately 20 acres each.

Parts of Johnston lagoon are protected from heavy wave action by a barrier reef along the northwestern quadrant rim and by the islands and shoals to the south. Elsewhere, the lagoon is semi- to heavily-exposed to open seas. Johnston is extremely isolated. Its nearest neighbors are French Frigate Shoals, Hawaii (450 miles), the Line Islands (800 miles) and the Phoenix Islands (1,300 miles). Johnston formed in the late Mesozoic and, aside from Wake, is the only shallow water atoll along the Marcus-Necker submarine ridge.

The atoll was discovered in 1796 and claimed for the U.S. flag in 1858. Early scientific expeditions indicated that only two species of plants originally grew on the islands and that the atoll had never been inhabited. In 1939, a seaplane landing area was dredged and since the late 1940s, Johnston has played a central role in the U.S. atmospheric nuclear testing program. One Thor rocket blew up on the launch pad; another was aborted shortly after takeoff in the early 1960s. The explosions scattered radioactive debris over much of Johnston's north side, requiring an extensive emergency cleanup effort. Radioactive debris was disposed of in the open ocean off the south side of the atoll. After the United States signed the atmospheric nuclear test ban treaty in 1963, it maintained only the basic capability to resume key atmospheric testing on the atoll. This Safeguard "C" status was further relaxed, and Johnston has been reduced to caretaker status. It now serves as a refueling stop for air traffic between Hawaii and Micronesia. It was designated a bird refuge in 1926 and later upgraded to a National Wildlife Refuge administered by the U.S. Fish and Wildlife Service. Although the atoll is still a refuge, other missions there function relatively unencumbered. Johnston's principal protected resources are nesting seabirds and coral reefs, and the Green Sea Turtle, a species listed as threatened by the U.S. Fish and Wildlife Service.

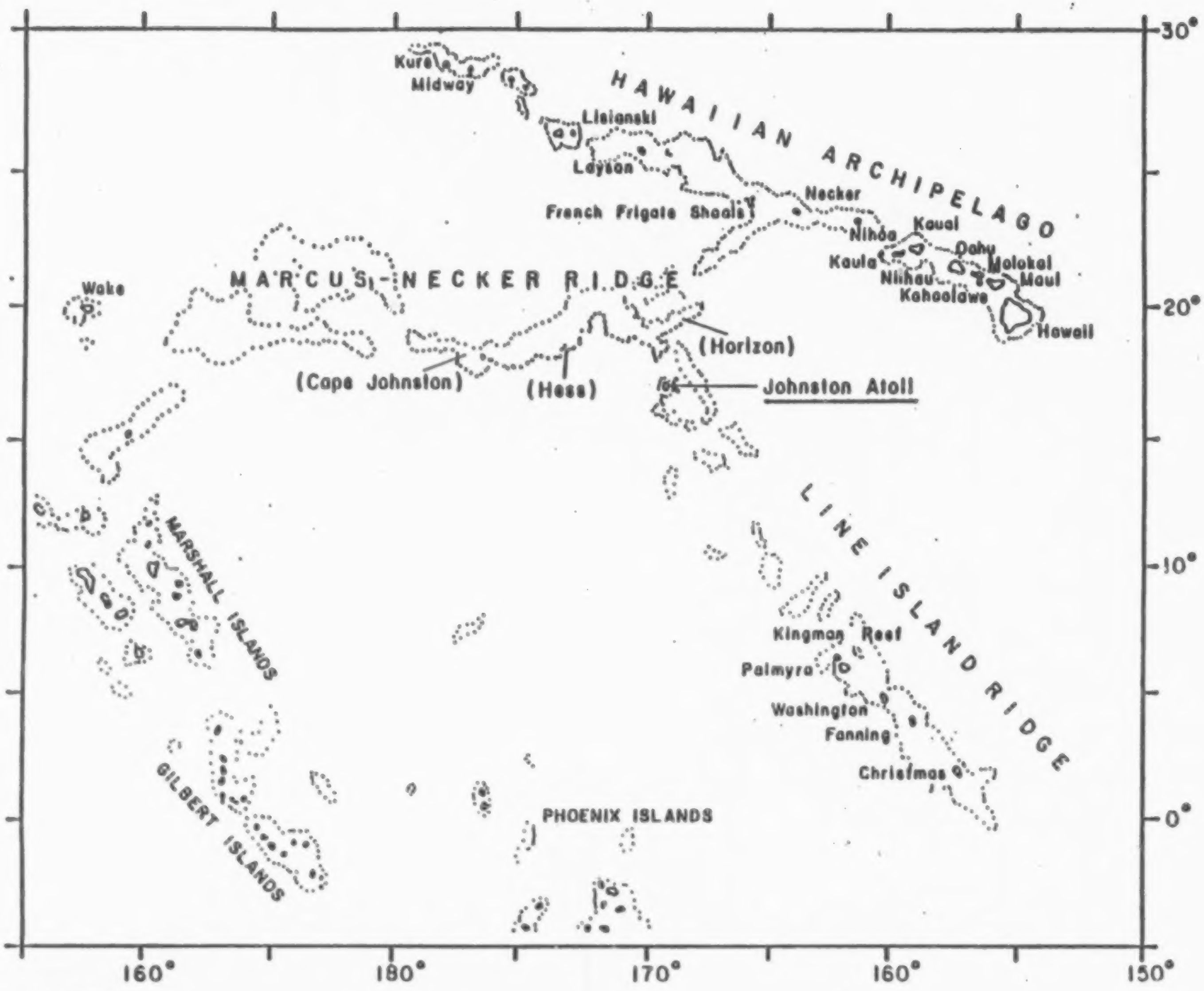
Johnston has served as a temporary repository for chemical defoliants and chemical munitions since the early 1970s. Agent Orange was stockpiled for years there after the Vietnam war and was finally incinerated at sea near Johnston in 1976. However, many of the storage drums had leaked, and both the ground and perhaps groundwater may be contaminated with dioxins. In 1970, chemical munitions stored at Okinawa were prevented from shipment back to the United States by a new federal law. Instead, they were shipped to Johnston Atoll and stored in bunkers and warehouses where they still remain (Red Hat area of Johnston Island). Some of these are also leaking. The Army plans to incinerate the chemical munitions in an explosive-proof facility now under construction. This will temporarily double or triple the atoll's human population (from 300 to a maximum of 900 people) and may result in increased recreational impacts to fish and wildlife, a possibility which concerns the U.S. Fish and Wildlife Service. However, the Army is cooperating with the Service and is supporting a staff ecologist, and various studies to inventory and monitor ecological resources, and to ensure that future cleanup actions also involve conservation programs for fish and wildlife.

Johnston's extreme geographic isolation and age make it of interest to scientists. Recent expeditions to the atoll and exploration with a deep-diving submersible have greatly increased our understanding of the atoll's ecology, geology, and marine environment.

Four recommendations are warranted for Johnston: (1) Continued

Congressional support for Army plans to rid the atoll of deadly chemical munitions presently stored there, (2) continued designation of the atoll as a National Wildlife Refuge and support for resource conservation programs, (3) careful Congressional scrutiny of the Johnston chemical incinerator facility to ensure that the Army does not expand its function to serve as a global or regional chemical munition destruction facility, and (4) greater access to the atoll for legitimate scientific purposes.

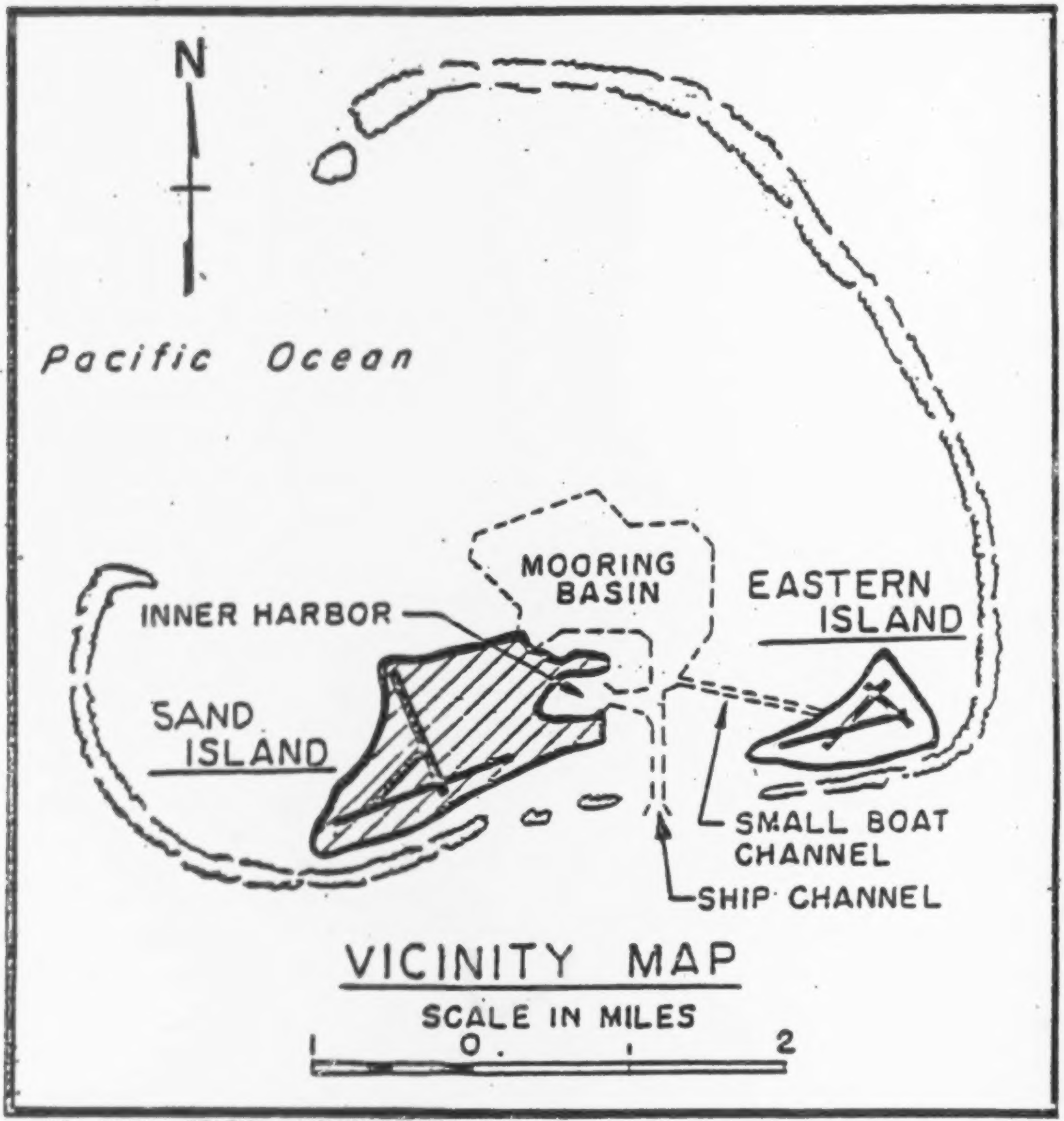
MAP 8


HAWAIIAN ARCHIPELAGO
Kure
Midway
Lisianski
Laysan
French Frigate Shoals
Necker
Nihoa
Kauai
Oahu
Molokai
Maui
Kaula
Niihau
Kahoolawe
Hawaii
MARCUS-NECKER RIDGE
Wake
(Horizon)
(Cape Johnston)
(Hess)
Johnston Atoll
LINE ISLAND RIDGE
Kingman Reef
Palmyra
Washington
Fanning
Christmas
MARSHALL ISLANDS
GILBERT ISLANDS
PHOENIX ISLANDS
30°
20°
10°
0°
160°
180°
170°
160°
150°

NOTE:

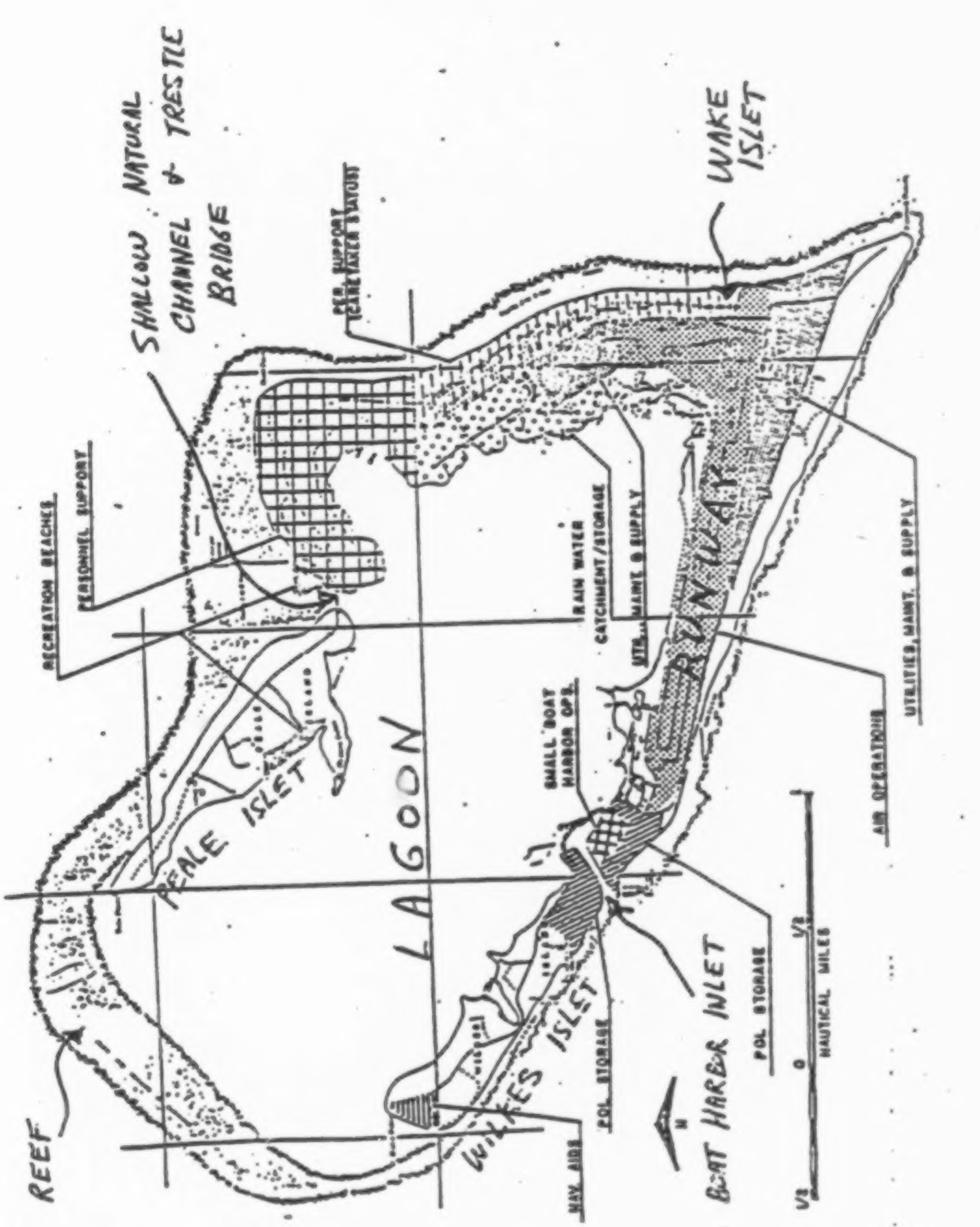
NAMES IN PARENTHESIS DEPICT INDIVIDUAL OR CHAINS OF SEAMOUNTS FAR BELOW SEA SURFACE AND THEREFORE LACKING LIVING REEF CORALS.

MAP 9

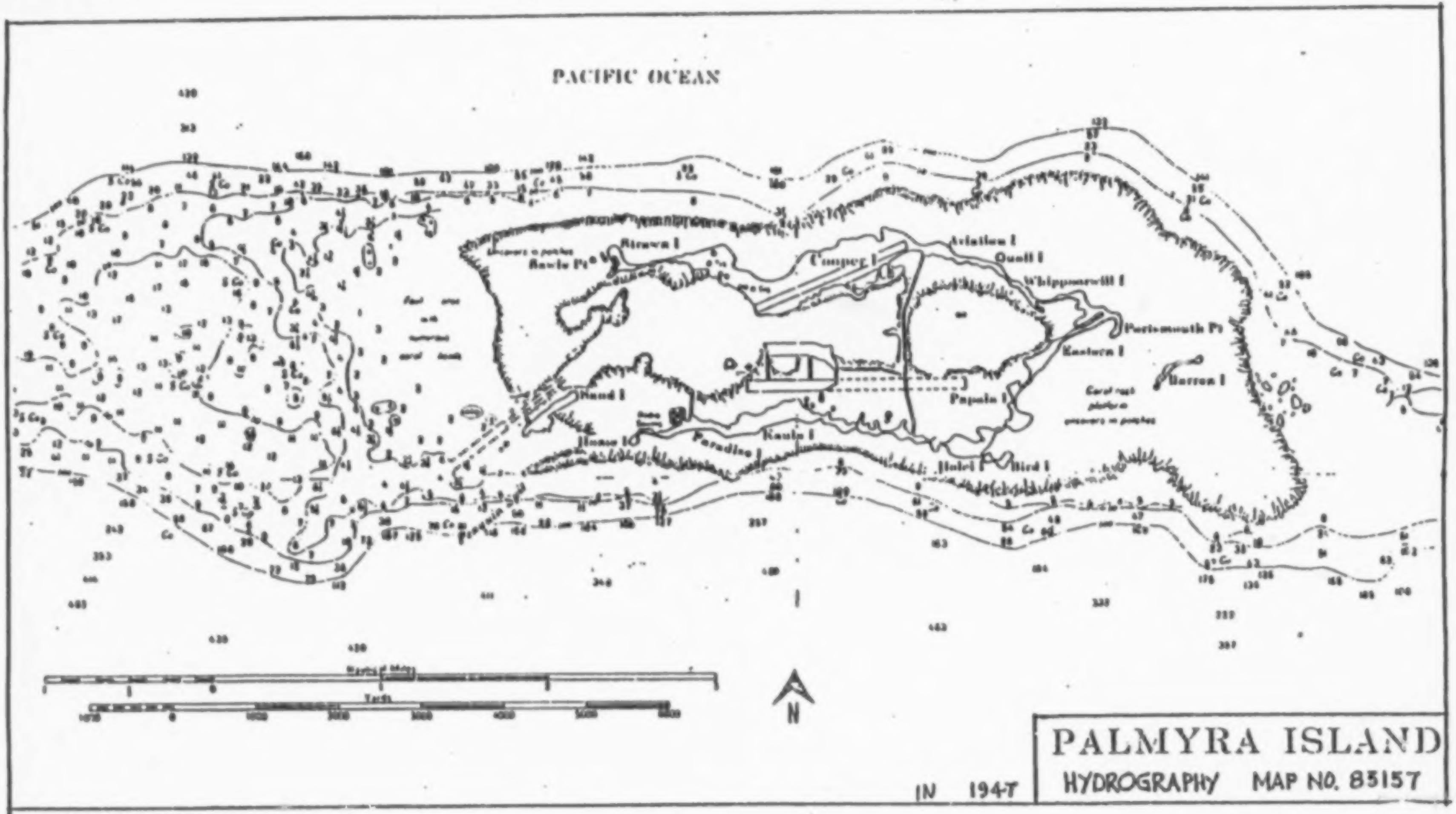

N
Pacific Ocean
MOORING BASIN
INNER HARBOR
EASTERN ISLAND
SAND ISLAND
SMALL BOAT CHANNEL
SHIP CHANNEL
VICINITY MAP
SCALE IN MILES
1
0
2

U.S. NAVAL STATION MIDWAY ISLAND

MAP 10


REEF
WILKES ISLET
PEALE ISLET
LAGOON
RUNWAY
WAKE ISLET
SHALLOW NATURAL CHANNEL & TRESTLE BRIDGE
SMALL BOAT HARBOR INLET
RECREATION BEACHES
PERSONNEL SUPPORT
RAIN WATER CATCHMENT/STORAGE
UTIL. MAINT. & SUPPLY
PER. SUPPORT (TRANSIENT & LAYOVER)
UTILITIES, MAINT. & SUPPLY
AIR OPERATIONS
SMALL BOAT HARBOR OPS.
POL STORAGE
POL STORAGE
NAV AIDS
N
1/2
0
1/2
NAUTICAL MILES

VICINITY MAP —WAKE ISLAND

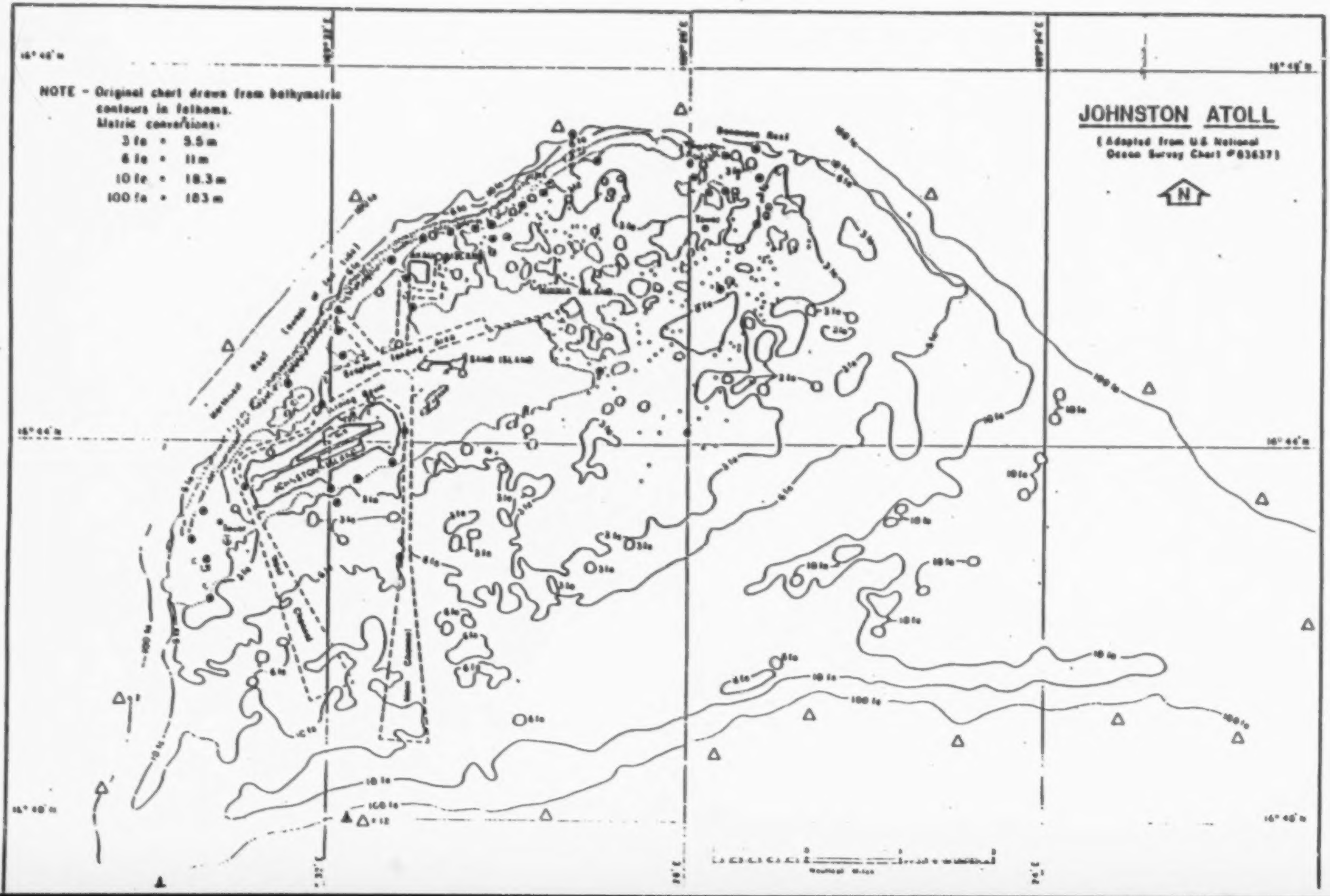

PACIFIC OCEAN
Strawn I
Rawle Pt
uncovers in patches
Cooper I
Aviation I
Quail I
Whippoorwill I
Portsmouth Pt
Eastern I
Barren I
Coral reef platform uncovers in patches
Papala I
Kaula I
Paradise I
Home I
Sand I
Hotel I
Bird I
Pool area with numerous coral heads
Nautical Miles
Yards
N
IN 1947

PALMYRA ISLAND
HYDROGRAPHY MAP NO. 83157

MAP 11

163

MAP 12


JOHNSTON ATOLL
(Adapted from U.S. National Ocean Survey Chart #83637)
N
NOTE - Original chart drawn from bathymetric contours in fathoms.
Metric conversions:
3 fa = 5.5 m
6 fa = 11 m
10 fa = 18.3 m
100 fa = 183 m
16° 45' N
16° 44' N
16° 40' N
Sand Island
Johnston Island
100 fa
10 fa
6 fa
3 fa
Nautical Miles

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SECTION 2:

COASTAL RESOURCE MANAGEMENT AND COASTAL ZONE MANAGEMENT

ABSTRACT

This paper (Part II) reviews past and present government programs and controls over conservation and development of coastal resources in the U.S. Pacific islands and suggests recommendations to promote more effective management. Coastal resources in the State of Hawaii and Territory of Guam have been heavily exploited, developed and degraded by urbanization, plantation agriculture, military construction and warfare. The other two U.S. Pacific "flag" territories (Northern Marianas, American Samoa) have been less affected and developed. Living standards are improving or are alrady high in all four areas, and the islands are eligible for a variety of federal grants and aids. A host of territorial or state and federal environmental laws and regulations can effectively guide future economic development, particularly in tourism, urban development, agriculture and fisheries. All four have federally sponsored coastal zone management (CZM) programs to coordinate development and conservation, and all appear to be dealing satisfactorily with coastal resource issues. The CZM program of the Commonwealth of the Northern Mariana Islands could merit additional funding and staff because of its expanded development planning responsibilities.

Programs to conserve coastal resources on other sovereign U.S. Pacific islands appear to be adequate. Most (Johnston, Jarvis, Howland and Baker) are wildlife refuges, uninhabited (Palmyra, Jarvis, Howland and Baker) or both. Those which are inhabited (Johnston, Wake and Midway) have effective resource conservation programs in effect. No other specific recommendations are made for any of the U.S. sovereign Pacific islands.

In contrast, the Trust Territory of the Pacific Islands (TTPI) administration has provided inadequate financial and technical support to promote economic development, self-sufficiency and coastal resource conservation in the Caroline and Marshall islands during the past four decades. Most of these islands are impoverished, undeveloped welfare states of the government. Capital improvements; operation and maintenance of facilities; land use and economic development planning; higher education, research and manpower training; and other socioeconomic needs are insufficient or absent. The Carolines and Marshalls have been ineligible for many federal assistance programs (including federally sponsored CZM) and some important environmental laws and regulations do not apply to the area. Furthermore, most federal environmental statutes that apply now will cease to apply upon United Nations ratification of the Compacts of Free Association for the three new nations emerging from the Carolines and Marshalls. Little effort to date has been placed in developing counterpart environmental laws and regulations. Many of the islands are experiencing phenomenal population growth and overexploitation of subsistence resources resulting in: overcrowding, malnutrition, depressed living standards, migrations, pollution and other problems, especially in the urban centers and small crowded outer atolls.

The former TTPI areas in the Marshalls and Carolines need additional support much more than any other U.S.-controlled area in the Pacific. The compacts will give the emerging nations full responsibility for their internal affairs, economic development and resource conservation. I do not believe these new nations can meet this challenge without considerable additional American support and technical assistance. I recommend federal funding of programs to:

(1) establish transitional and counterpart environmental regulations;
(2) establish coastal zone management programs;
(3) continue EPA cleanup of water pollution and solid waste;
(4) establish safe and adequate drinking water supplies;

(5) inventory and clean up military debris, hazardous waste and unexploded ordnance;

(6) develop higher education, research and manpower training centers;

(7) improve telecommunication and transportation facilities; and

(8) extend planning assistance and selected public works authorities to the region.

INTRODUCTION

The Office of Technology Assessment (OTA) asked me to prepare an overview of the coastal resources, related cultural history, coastal development and resource conservation needs for all the U.S. territories and possessions in the tropical Pacific Ocean. An island-by-island description of this information is presented in the first report. OTA further requested I evaluate existing legislative and administrative mechanisms for the management of coastal resources in these islands and offer solutions to significant problems; this is accomplished here in the second report. The geographic coverage and types of coastal resources addressed are described in the first report. Much of this report concentrates on the Marshall and Caroline islands, formerly administered under the Trust Territory of the Pacific Islands, because the coastal resource development and conservation problems in these islands are an order of magnitude more serious than those of the other U.S. Pacific islands.

This second report begins with a brief summary of the major coastal resource management issues followed by conceptual comparisons between coastal zone management (CZM) and coastal resource management (CRM). The status and opportunities for CZM and CRM are then briefly introduced, including appropriate U.S. Congressional objective and actions. The past, present and future contribution of federal and territorial environmental regulations and laws to natural resource management in the U.S. Pacific islands is also presented, taking note of the fact that many federal environmental statutes will no longer apply to the Marshall and Caroline islands after United Nations ratification of the Compacts of Free Association. Finally, the institutional arrangements and recommendations for future CZM or CRM programs are presented.

REVIEW OF COASTAL RESOURCE MANAGEMENT PROBLEMS IN THE U.S. FLAG TERRITORIES, RELATED POSSESSIONS AND HAWAII

Management problems in the State of Hawaii, the three "flag" territories (Guam, Northern Mariana Islands, American Samoa) and other sovereign U.S. island possessions in the Pacific were discussed in the first report. In the territories and Hawaii, the most important remaining challenges will be controlling the impact of economic development (residential, public works, military and resort) on valuable coastal resources (especially coral reefs, wetlands, beaches, streams and estuaries). Solid waste and water pollution from municipal, agricultural and industrial sources will pose threats to some coastal systems and their uses. Inadequate management and overfishing of nearshore fishery stocks is a serious problem and a lesser but growing problem in all three flag territories. As population levels increase, demands on these limited resources will also increase. Although a host of environmental and coastal resource legislation applies to all areas, innovative management will be needed to slow down the degradation of important coastal resources. Additional legislative proposals are not recommended for the state and territories.

Coastal resource management problems are not serious in any of the other U.S. island possessions. Palmyra, Howland, Jarvis and Baker are uninhabited, and the last three are also National Wildlife Refuges administered by the U.S. Fish and Wildlife Service. Johnston, Midway and Wake are occupied by small contingents of military and transportation (Coast Guard, FAA) personnel, but all three have active fish and wildlife conservation programs. Johnston is also a National Wildlife Refuge. No further legislative or administrative recommendations are needed.

Resource Management Problems Common to Most Areas in the Former TTPI

The most critical issue facing the Carolines and Marshalls today is skyrocketing population growth. After a century of population decline owing to exotic (western) diseases, warfare, displacement from ancestral lands and other factors, the trend abruptly reversed about four decades ago throughout the Territory, especially in the urban centers. Recent advances in sanitation, nutrition and health care have contributed to this growth, and the median age of the population in many districts is mid to late teens.

Some results of this growth are:

(1) Overcrowding of some islands and outer atolls where land is limited, forcing some emigrations and depressing living standards.

(2) Migration of younger adults to district centers in search of jobs and better living conditions, stimulating landfill projects in coastal waters to accommodate new dwellings.

(3) Increasing pressure on coastal resources as populations increase. (Decline and depletion of fishery resources is evident in some district centers already.)

(4) The use by some fishermen of explosives and poisons to increase catches, accelerating the destruction or degradation of the fishery habitat.

(5) Competition between recent migrants to the district centers and long-term residents for the same fishery resources, possibly reducing catches over

the long term and eroding traditional customs and rights over the use of coastal resources.

Western concepts of land ownership and a cash economy are replacing subsistence lifestyles and communal land ownership traditions. For two centuries, traders and merchants sold or traded goods to the islanders. German, American and Japanese rule in the islands introduced concepts of fee ownership and government condemnation of lands for public purposes including military use. With a system of private land ownership, land could be bought and sold on some islands to generate cash income, to promote economic development and plantation culture, or to further the colonial ambitions of the ruling powers. World War II was particularly disruptive, causing many casualties or evacuations of whole villages, disrupting island lifestyles and consuming land for strategic facilities. All of these factors took control of land from the islanders. Decades of American administration have not completely resolved these problems. Instead of encouraging private enterprise and associated economic development, the government has become the principal employer, the source of most funds, and the generator of a welfare culture and of disincentives to return to a more traditional or self-sufficient lifestyle. The copra, fishing and handicraft industries that flourished under colonial rule have declined under American rule and without significant replacement ventures beyond some tourism.

The government has been poorly organized and inefficient in guiding development activity which is to a large part haphazard and/or out of control. Lack of comprehensive land use or development planning and guidelines has created slums and unhealthy living conditions in most district centers. The public works departments in most districts have not been given the proper training and resources to maintain power, water, roads, wastewater management facilities, and other public services. Solid waste and refuse management is nonexistent. Hazardous and unsightly debris and refuse accumulates on wetlands, beaches and reef flats. Water of adequate supply and quality is of critical concern in most district centers as populations continue to grow. Although sewer outfalls and treatment plans are now being constructed via EPA grants, funds and authority to hook up the residences and buildings to the new facilities are deficient or lacking. The distribution, extent and severity of hazardous waste, and of unexploded ordnance from World War II, are poorly documented. Although the marine resources and fisheries offices recognize the potential for future development of commercial fisheries and aquaculture, and for increased catch of lagoon and reef fin and shell fish in some locations, they have not been effective in maximizing multiple and sustainable uses of aquatic resources. Use of explosives and poisons in some districts has become widespread, and enforcement and penalties for offenders are not actively pursued. Most offices lack a basic inventory of the coastal resources of value to future development and/or to existing lifestyles of the islanders.

The remote or small coral islands and atolls provide a special set of management problems. As populations increase, overcrowding or emigration of excess population will be inevitable unless the subsistence base is supplemented with economic activity that will provide cash to buy food and other goods. Yet, many of the outer islands lack adequate communication with the ever-changing outside world and the basic infrastructure and transportation facilities necessary for future economic activity. For example, medium draft docks or harbors would be desirable on most atolls for export and import trade, to support fishing fleets, or to facilitate emergency flight from storms, typhoons, illness or epidemics. The construction of small airstrips on some atolls (that can afford the loss of productive copra land) could also help to stimulate economic activity, tourism and communication, and to facilitate government administration. Increased ability to catch and store rainwater should be an important priority on outer islands subject to expanding populations. Increased self-sufficiency in electrical power generation would help to reduce the need for expensive foreign fuel. To my knowledge, there has not been a recent systematic evaluation of the socio-economic and development needs of the outer islanders, and most of the master plans developed for the district centers have not been followed closely. The first five-year economic development plan for the Federated States of Micronesia was approved in 1985, but awaits Compact of Free Association funding.

With the Compact of Free Association moving closer to ratification, there is still much to be done if Micronesian islanders are to maintain their lifestyles, promote acceptable development, and control their economic destiny. Neither cutting purse strings nor providing funds with few strings attached will benefit the islanders in their quest for self-sufficiency. All of the islands and their cultures are in transition: the large families, appropriate during the 19th-century decades of disease and declining populations, may no longer be appropriate in this era of improved health care, high infant survivorship and burgeoning populations. The natural resources of the islands have been and will continue to be limited. The need for population control, sustained use of renewable resources, and orderly economic development are significant challenges. The problems and challenges in the Marshall and Caroline islands are an order of magnitude more critical than those of the other territories and possessions under the United States flag.

COASTAL RESOURCE MANAGEMENT AND COASTAL ZONE MANAGEMENT

The United States was the first country to pass national coastal zone legislation (1972) addressing the need for comprehensive management of coastal resources. However, only a fraction of the continent is "coastal" and considerable attention initially was focused on delineating coastal zones to be governed by management plans. By contrast, little land in the U.S. tropical Pacific and the State of Hawaii is noncoastal. There is no need to delineate zones, and instead effort should be directed at identifying coastal resources of significance. This approach has been adopted by several island developing countries. Focusing on resources rather than a zone also tends to prevent political turf battles between agencies and levels of government, a problem that consumed considerable energy and time for many of the U.S. states which developed CZM programs.

Nevertheless, a two-tiered approach may also be of benefit to small islands if a very narrow, intensively-managed zone near the shoreline is designated. Within this zone a permit program could be established early in the CRM initiative as an interim or emergency measure to ensure that the most important coastal resources (which often are near the shoreline) are not unnecessarily degraded by individual development projects while a full CRM plan is being developed and implemented. Continuation or modification of the permit procedures in the narrow coastal zone would then depend upon the outcome of the CRM plan finally adopted. It is premature here to recommend a specific "zone" width, location or types of projects and resources that would be governed as a part of a CRM program. This is the responsibility of the planning process, and the parameters could vary considerably between one island region and another.

Coastal resource management (CRM) is a holistic form of planning and decisionmaking that aims to maximize sustainable multiple uses of coastal resources and to conserve these resources. Although there is no set procedure for CRM, planning in this context should consist of several components regardless of the scale of the proposed management scheme:

(1) a commitment to CRM by the government and island communities;

(2) a geographical inventory of important coastal resources, resource

uses, demands, values, functions, and the existing mechanisms (if any) that manage them; and

(3) development of policies and guidelines for resource allocation. Management in this context involves:

(4) grassroots education, including the use of community, liaison or extension services;

(5) assigning the responsibilities for CRM to lead, participating agencies, and to community groups of individuals as warranted;

(6) evaluating proposed development and use options for coastal resources against the plan;

(7) assessing the environmental consequences of a full range of options for each development proposal; and

(8) selecting the alternative that best maximizes economic development and conservation of coastal resources.

A government and community commitment to CRM will be essential as a first step. From a practical standpoint when the need for development is great, there will be little policy support for measures (such as environmental permits) that will inhibit the development process. Hence, the perception of CRM as a facilitator rather than an inhibitor of development will need to be designed, communicated, and supported at the community, private and political levels if it is to succeed. The success of CRM will also be dependent upon the socioeconomic readiness of the country to adopt and implement it. Hence, educational and public relations efforts will be needed to acquire and retain a commitment to CRM.

Ideally, all levels of government are involved in the CRM process, but there is usually a lead agency designated (by executive order or law) to be responsible for CRM. Although a lead agency (existing or new) should be responsible for planning and coordination, the actual execution of the plan and management of coastal resources could extend to several other agencies with established mandates and responsibilities over coastal resources. The planning process should be iterative and open to ensure that communication, understanding and eventually agreement is established among all individuals with information, claims or interest in the coastal resources. There should be an attempt to identify all possible uses and functions of the coastal resources before management decisions are made. It would be premature at this time and beyond the scope of this paper to advocate a specific management and organizational strategy for CRM in the Marshalls and Carolines without considerable public coordination and review. This would constitute a major objective of the planning process to develop a CRM plan.

Transitional or interim measures might be put into effect initially to redirect development to protect threatened coastal resources. These measures could include an "emergency" permitting procedure for coastal projects in a narrow shoreline zone, evaluating each project against a checklist of CRM policies or parameters or other simple techniques. The interim controls would serve to instill a resource management awareness while more permanent and holistic CRM strategies are considered and developed. In the absence of a full scale CRM approach, the interim measures could serve as a compromise (compared to no measures at all).

At the national level, CRM will primarily be concerned with establishing national policies, and sponsoring inventories, research and development, and training. The U.S. has provided "incentive" grants (Section 305) to eligible coastal states to promote timely development of acceptable Coastal Zone Management (CZM) plans. After technical, policy and legal review and approval by the national office (now the Office of Ocean and Coastal Resource Management of NOAA), the states and territories with approved plans become eligible for additional funds (under Section 306) to implement and operate the plan, subject to annual reviews.

At the regional level (state or territorial), governments are charged with the responsibility to operate or administer the CRM plan. This usually involves assignment or reassignment of agency responsibilities, a geographic inventory of resources and preparation of implementation plans, guidelines or policies applicable to the region designating preferred uses of resources. Decisions are based in part upon interpretation and application of national policies. The state, or regional, programs also sponsor participation of other state or local government agencies in research and development projects, and plans for areas of particular concern. Also an important function is the state-level review of proposed Federal or other development projects to determine consistency with the approved state CRM plan.

At the local level (city, county or village), governments and agencies make many decisions on specific development projects day to day. They may also implement development projects, develop regulatory review and approval procedures for specific projects, conduct studies, establish setbacks, narrow coastal zones (to be subject to control by a permit process), special design districts, and areas of particular concern, consistent with the approved CRM plan. All three levels of government make decisions based considerably on public input and opinion. Special conditions, restrictions or measures may be stipulated as part of any decision in favor of a project.

At the community or grassroots level, public awareness and education programs could be developed including use of audio-visual media, to convey the adverse consequencies of poor resource use and to convey the benefits of paper development. Manpower and advanced educational programs could also be developed for the staff and officials to be responsible for management decisions--both public and private. Local colleges could be upgraded as a result of these and other institution building projects as a part of a CRM program.

STATUS OF COASTAL RESOURCES MANAGEMENT IN THE U.S. PACIFIC ISLANDS

The State of Hawaii and the flag territories of Guam, American Samoa and the Northern Mariana Islands (NMI) all became eligible for Section 305 funds under the Coastal Zone Management Act of 1972 (CZMA). Between 1974 and 1980, all were able to obtain such funds, develop draft CZM plans that were approved by NOAA, and become eligible for Section 306 funds. All continue to receive Section 306 funds to help operate and manage their CZM programs. Annual evaluations by NOAA and continued Federal support indicate that all four ecisting management programs are operating satisfactorily and in compliance with CZMA policies and regulations.

The TTPI was not eligible for funds under the original authorization for the CZMA. When the Act was reauthorized in 1980, the TTPI was made eligible for Section 306 funds but not for Section 305 funds. The TTPI could not take advantage of its eligibility for Section 306 funds (for operation and management of approved plans) because they had neither the technical nor financial resources to develop the plans in the first place without Federal assistance. As an area, the TTPI comprises over 900 mostly small islands and 3 million square miles of ocean--more than the three flag territories and the State of Hawaii combined. To have developed an acceptable CRM or CZM plan to meet NOAA standards would have cost an amount comparable to what was spent on the Section 305 studies for the three flag territories and Hawaii. Even if initial efforts were limited to district centers, funding would have exceeded the TTPI budget. Neither the Compact of Free Association nor recent proposed revisions to the Compact mention need for funds to develop coastal zone or coastal resource management plans. Island authorities and Federal negotiators responsible for the development of the Compact may not recognize or acknowledge a need for CRM or CZM in the Territory. Regardless, there is a compelling need which has been voiced by Governors and other officials in the TTPI.

Since 1978, the Corps of Engineers (Pacific Ocean Division) has sponsored a number of coral reef and coastal resource inventories in the tropical Pacific. All but one of these projects were supported by Section 22 (Planning Assistance to States) of the Water Resources Development Act. To date they have covered the islands of Oahu, Maui, West Hawaii, Kauai, and Molokai in the State of Hawaii; Moen Island in Truk; and Pohnpei in the Caroline Islands. A Corps-managed American Samoan coral reef inventory was also sponsored by CZM funds transferred to the Corps by the American Samoan government, at the latter's request. Both the completed Moen inventory and the nearly completed Pohnpei inventory were requested by the Governors of the respective states (districts). In the case of the Moen study, the Governor also requested management recommendations to conserve coastal resources. The government is sponsoring development of a coral reef management plan for Pohnpei based upon the results of the Corps-sponsored inventory.

The Corps has received requests from the Governors of Yap and Kosrae to initiate inventory studies, but Section 22 funds are very limited, and original data collection (coastal resource inventories) is not authorized. Also, the U.N. ratification of the compacts may end Section 22 authority to the Marshalls and Carolines. As a consequence, the Corps may not be sponsoring inventories in the U.S. tropical Pacific, despite the need, requests from Governors, and the expressed appreciation and wide use of the completed inventory products (see Appendix A-2). Indeed, without knowing the size, location, values, uses and characteristics of important resources, it is not possible to plan for development that avoids both impacts to important coastal resources, foreclosure of future economic development options, and subsistence requirements.

At present, the new governments lack only technical ability and funding, not the desire, for CRM. Until the Compacts of Free Association are ratified by the U.N., key coastal permitting responsibility will remain with the Corps of Engineers in accordance with Section 404 of the Clean Water Act. The Corps issues permits only for discharge of dredge or fill materials into waters of the United States, but the program does not address construction and dredging which doesn't involve filling or discharges of dredged materials in these waters. The record of the Corps permit program in the TTPI since 1976 is mixed. The Corps is clearly understaffed to monitor and enforce the program from Hawaii or Guam and has attempted to rely on other Federal agencies (U.S.

Fish and Wildlife Service, National Marine Fisheries Service Advisory Council on Historic Preservation, EPA) and territorial offices (Territorial Historic Office, Environmental Protection Board, Marine Resources Office) for information and advice and on-site monitoring. Some of many large construction and piecemeal landfill projects approved during the past 9 years have caused significant impacts which could have been avoided with better surveillance and planning. At the territorial level, the former TTPI environmental protection boards have principal environmental responsibility, but their authority appears to be limited to water quality, sanitation and the effects of earthmoving. They have been ineffective in compelling applicants to evaluate alternative sites and procedures, and lack authority over all aspects of development not strictly dealing with earthmoving. TTPI planning and marine resources management offices have little impact on CRM. Staffs are small, data are limited, and permitting and project approval authority is essentially nonexistent. Although development plans are prepared and updated periodically for district offices and islands, comprehensive and long-range land-use planning and controls (such as zoning) are lacking. CRM would be extremely beneficial to the TTPI, given the trends of rapid population growth and ever-greater exploitation of limited renewable resources.

OPPORTUNITIES FOR COASTAL RESOURCE MANAGEMENT IN THE TTPI

Economic development and conservation of coastal resources would be the primary benefits of well-organized and supported CRM in the TTPI. In light of the Compacts of Free Association, it may be logical that separate CRM programs be established in each of the three new and separate nations: the Federated States of Micronesia (FSM), Republic of Belau, and Republic of the Marshall Islands. Nevertheless, U.S. federal sponsorship and monitoring of all three could be centralized under one agency. Each program could be subdivided to address the needs of the urban centers and outer islands and atolls. Each new nation would require a centralized coordinating and planning agency to develop, manage and enforce CRM programs. The existing planning offices, marine resources (fishery) offices, and environmental protection boards would all need substantial upgrading, reorganization, training, and staffing to assume that role. It would make equal sense to establish a new coastal office, especially for planning and coordination, drawing upon the resources of the other offices for support and management (networking). The actual management and enforcement of the plan could be shared among several key agencies, provided that the responsibilities of each are clearly delineated. The central office would need to coordinate with other developmental agencies (forestry, agriculture, public works, transportation, fisheries, tourism, economic development, etc.) on a routine basis to develop, review, revise and manage the plan, including input on decisions for specific development ventures. A key to success of any CRM strategy is simplicity and the ability of CRM to be absorbed easily within the existing governmental framework. Thus, a central programming, coordinating and planning agency and delegated management authority to several existing key sectoral agencies seems to be a feasible venue for the former TTPI areas.

Outside expertise will be required for resource inventories, research and development projects, manpower training, planning and evaluation of specific development proposals, public involvement, and education programs. To date, only a fledgling Community College of Micronesia exists in the TTPI at Pohnpei (FSM). Institutions of higher education are entirely absent in the Marshalls and Palau, and previously active scientific research stations in these areas are now defunct or nearly so. Considerable assistance must come from outside universities with tropical coastal experience. The most likely candidates are the University of Hawaii, University of Guam, and University of the South Pacific. Assistance from universities in northeast Australia and some developing countries in the Pacific (Philippines, Papua-New Guinea, etc) may also be warranted. A more ambitious proposal would be to substantially upgrade the Community College of Micronesia; to establish institutions of higher education and research in the Marshalls and Palau. with CRM-related curricula and research; and to strengthen ties with existing tropical Pacific universities or regional scientific programs (such as SPREP).

Table 1 presents an outline of the principal socio-economic and resource conservation issues that could be addressed to some extent by the CRM programs in each of the three new nations. Some issues are clearly more within the realm of CRM than others, and it is beyond the scope of this paper to address these in detail here. The reader is referred to the geographical descriptions in the first part of the report for focus on specific issues for each island group. Table 2 presents the suggested technologies for fulfilling the planning and CRM needs of each area. The list of issues in Table 1 is somewhat exhaustic and ambitious, and may be beyond the limited resources of a CRM program to address in the near term. Priorities would need to be established for each region and island, and high priority issues may vary between one island and another. Several major issues, however, seem to be common to all islands: liquid and solid waste management, protection of fishery stocks and habitat, protection of domestic water supplies, and regulatory control over development that can cause significant impact. Other important concerns common to many areas include: facilitating tourism (while minimizing its adverse impacts), conservation of mangroves, and protection and planning for natural coastal hazards.

Coastal resources management offers the best means of addressing a number of important socio-economic and coastal conservation issues facing the emerging countries in the Caroline and Marshall Islands, such as major migrations from the outer islands and rapid population growth. CRM could help identify important subsistence and traditional fishing grounds and impose measures to ensure their continued use on a maximum sustainable yield basis; help to identify and plan for small dock, airfield, and water catchment projects in the outer islands; and evaluate the future of the copra industry and other agriculture or aquaculture ventures. It could assist in promoting commercial fishing in pelagic waters and identify appropriate sites, infrastructure requirements, and controls for tourism development. In the urban centers, CRM planning initiatives could help to identify priorities and sites for future public works projects, especially water supply, wastewater management, energy, and solid waste management facilities. land-use planning supported by a CRM program could mitigate ecological and public health impacts of urban development. The CRM could also identify levels of sustainable resource use, improve education on the islands, and initiate programs to discourage use of explosives for fishing. Finally, CRM could promote western-style economic development where it is desired, preserve the traditional subsistence lifestyles where they are desired, or promote a mixture of both philosophies where it is desired. For emerging nations characterized by many small islands, CRM offers the most sensible approach to economic development and conservation of coastal resources.

APPROPRIATE OBJECTIVES OF U.S. CONGRESSIONAL ACTIONS TO FOSTER COASTAL RESOURCES PLANNING AND MANAGEMENT

Economic development and conservation needs can also be met legislatively. Major objectives are to:

(1) promote the orderly growth, distribution and welfare of the population through family planning, planned development and communities, improved medical care, improved education and community and outpatient

services;

(2) promote the preservation and use of traditional lifestyles where they are preferred in part or in total over western/economic-based lifestyles;

(3) promote development of small-scale water, transportation and communication facilities to improve the general welfare and economies of the outer islands through government-subsidized public works projects;

(4) diversity agricultural cash crop production in the outer islands through loans and the opening of new markets;

(5) increase commercial agriculture and aquaculture in the district centers through loans and grants, pilot projects, training programs, and increased trade with new markets;

(6) conserve subsistence fishery resources and promote maximum sustainable use and economic return for commercial fishery resources through assessment and monitoring of fish stocks and catch, and in establishing subsistence requirements prior to commercial sale;

(7) promote acceptable and appropriate tourism and handicraft industries through economic grants, aids, loans and training programs;

(8) encourage energy self-sufficiency in the urban centers by promoting and implementing hydropower, solar heating, photovoltaics, wind power and other appropriate technologies;

(9) encourage organized and helpful urban development through appropriate land-use controls and design guidance;

(10) improve standards of living and public health in the urban centers by supporting wastewater management and solid waste management projects and improving drinking water supply and quality management;

(11) promote establishment of centers of community education, extension, higher education and research in all three emerging countries by upgrading the Community College of Micronesia oh Pohnpei, establishing colleges in Palau and the Marshalls, and upgrading field research stations in Enewetak and Koror; and

(12) promote preservation of fragile cultural, social and biological resources in Micronesia, and of coastal resources of commercial, subsistence, traditional, recreational, scientific and genetic value.

The following are legislative objectives that would foster coastal resources planning technology to support sustained resource development:

(1) encourage the emerging countries to adopt policies and legislation on coastal resources management.

(2) encourage the emerging countries to develop CRM plans and establish a

lead CRM agency and programs;

(3) support inventories of existing management authorities and coastal resources in the new countries, giving first priority to the urban (district) centers, followed by the outer islands;

(4) encourage the University of Hawaii (including the East-West Center), the University of Guam and other institutions in the tropics to assist in the inventorying, research and development and other special coastal resources studies and projects;

(5) promote training and education in CRM through publications, television specials, workshops, scholarships, special courses, student exchange programs and other means; and

(6) promote grassroots support for CRM through public meetings, extension, services and educational media.

REVIEW OF FEDERAL REGULATIONS, POLICIES AND LEGISLATION THAT MAY SUPPORT OR INHIBIT SUSTAINABLE, RENEWABLE RESOURCE DEVELOPMENT

Below is an overview of existing Federal planning and environmental statutes that currently apply to the U.S. Pacific islands and of the role each plays in coastal resources management.

NATIONAL ENVIRONMENTAL POLICY ACT (NEPA)

NEPA currently applies to all major Federal actions, including development projects (e.g., ports, airfields) and permits throughout the entire U.S. Pacific. Although this Act requires environmental analyses and preparation and coordination of environmental impact statements for all significant Federal actions, it does not apply to non-Federal actions nor actions by private enterprise not subject to Federal permit. After the Compact of Free Association is ratified, NEPA will apply only to future U.S. federal programs in the new nations (such as military training, missile testing programs, etc.). Although the Compact calls for counterpart regulations and legislation, there has been little dialogue and no action to date.

ENDANGERED SPECIES ACT
NATIONAL HISTORIC PRESERVATION ACT
ARCHAEOLOGICAL AND HISTORIC DATA PRESERVATION ACT
MARINE MAMMAL PROTECTION ACT
MIGRATORY BIRD TREATIES AND ACTS

All the above presently apply throughout the U.S. Pacific islands, but will no longer apply to the Marshalls and Carolines once the Compact is ratified. There was some earlier dialogue about counterpart laws and regulations, but nothing has come of it.

COASTAL ZONE MANAGEMENT ACT (CZMA)

This was described earlier at length in this report. During early authorization, the Act applied only to the State of Hawaii and the three flag territories. Although Section 306 of the Act was applied to the TTPI in 1980, CZMA funds were never provided. After ratification of the Compact, none of the provisions of the CZMA will apply to the TTPI. No counterpart CZM or CRM legislation is in the works at this time.

PLANNING ASSISTANCE TO STATES (SECTION 22, WATER RESOURCES DEVELOPMENT ACT

Provisions of Section 22 are administered by the U.S. Army Corps of Engineers. Section 22 funds have sponsored comprehensive coastal resources and coral reef inventories in Hawaii and for Moen and Pohnpei (Map C) in the TTPI and other water resources investigations in Micronesia. The inventories could serve as models for other islands, but recent guidance from the Corps headquarters indicates that Section 22 funds may not be used for future resource inventories after Compact ratification. Development of CRM management plans may also be eligible for funding, but existing funding levels are too low to make this an attractive option. Section 22 will continue to apply to the State of Hawaii and the three flag territories, but probably not to the Carolines and Marshalls after U.N. ratification of the Compact and termination of the trusteeship.

OTHER COASTAL RESOURCES INVENTORIES

The U.S. Fish and Wildlife Service has sponsored some stream and forest bird surveys throughout Micronesia. The National Marine Fisheries Service has surveyed commercial fishery resources throughout the tropical Pacific. The U.S. Forest Service has recently surveyed the forests of U.S. Polynesia and Micronesia. The Corps of Engineers also sponsored a comprehensive set of wetland inventories in Hawaii, American Samoa, Mariana, and Caroline Islands. Finally, NOAA (Office of Coastal Zone Management) and successor offices have administered CZM programs in Hawaii and the three U.S. flag territories, involving resource inventories in all four areas. The coral reef inventory in American Samoa, sponsored by NOAA and managed by the Corps, was patterned after the other Corps Section 22-sponsored resource inventories.

DEFENSE ENVIRONMENTAL RESTORATION ACCOUNT (DERA)

DERA was recently extended beyond Hawaii to Guam and possibly other U.S. flag territories, but not to the former TTPI areas. DERA is authorized under the Defense Appropriation Act and provides the Corps with the ability to clean up unsightly debris, hazardous waste, and unexploded ordnance at formerly used test sites. Extension of DERA to the former TTPI could facilitate the clean-up of many World War II and military areas in the Marshalls and Carolines. The Marshalls and Carolines were major battlegrounds during World War II.

RIVER AND HARBOR ACT (OF 1899)

This presently applies to all areas except the former TTPI and certain U.S. island possessions. This Act authorizes the Corps of Engineers to issue Section 10 permits for work (such as dock work) in navigable waters of the United States.

MARINE PROTECTION RESEARCH AND SANCTUARIES ACT

This act applies to all U.S. Pacific islands but will no longer apply to the Carolines and Marshalls (except the Kwajalein Missile Range, a Federal installation on leased lands and other military operations on Palau) after ratification of the Compact. This Act authorizes the Corps and EPA to issue permits for ocean dumping of wastes.

RESOURCE CONSERVATION AND RECOVERY ACT (RCRA)

This Act applies throughout the U.S. Pacific and authorizes EPA to issue permits for the storage, transportation and disposition of hazardous waste. Afetr ratification of the Compact, RCRA will no longer apply to the Carolines and Marshalls (except the Kwajalein Missile Range).

SUPERFUND (CRCLA)

This Act presently applies to all the United States areas in the tropical Pacific, but will no longer apply to the Caroline and Marshall Islands after ratification of the Compact. The Act authorizes EPA to investigate and fund clean-up programs for old hazardous waste dump sites. Many such sites probably exist in the TTPI, and unless the Superfund and/or DERA programs are extended to the TTPI, many of these dumps will not be cleaned up.

CLEAN WATER ACT CWA)

Both EPA and the Corps administer programs throughout the U.S. tropical Pacific in accordance with the CWA. The Corps Section 404 permit program extends to all areas and regulates the discharge of dredged and fill materials into U.S. waters. EPA issues permits for the discharge of wastewater effluents under Section 402 and administers the construction grants program for sewage treatment and outfall facilities. Other sections and provisions of the Act authorize promulgation of water quality standards and criteria and their management and enforcement. The Clean Water Act will no longer apply to the Carolines and Marshalls after ratification of the Compact but will continue to apply to all other areas.

A good case can be made for retention of Corps and EPA-like permit programs and the EPA wastewater construction grants program in the Marshalls and Carolines after Compact ratification. The construction grants program has contributed to the clean-up of water pollution problems. Federally-managed permitting procedures, however, have been cumbersome, misunderstood, and unpopular in many districts and ineffective in controlling some problems. Management has not been innovative; for example, Section 404 funds were not used to sponsor coastal resource inventories in areas subject to many permit activities. The new island nations should develop and administer counterpart permit programs learning from the lessons of the federal experience, but virtually no interest in this has been expressed.

SAFE DRINKING WATER ACT

EPA presently administers safe drinking water programs throughout the U.S. insular Pacific. However, the Act will no longer apply to the Carolines and Marshalls after ratification of the Compact. Since much of the Trust Territory still has serious drinking water problems--both in supply and quality--the extension of this program beyond the Compact to the emerging nations has some merit.

CLEAN AIR ACT

The Act presently applies only to the State of Hawaii and possibly the flag territories. It provides for control of emissions and management of air quality standards. EPA administers the Act.

TOXIC SUBSTANCES CONTROL ACT (TOSCA)

PESTICIDES ACT

Both of these Acts are administered by EPA and apply to all U.S. Pacific areas but will cease to apply to the TTPI after ratification of the Compact.

SEA GRANT (NOAA)

A Sea Grant program has existed at the University of Hawaii since 1968 and for a shorter time (and with less funding) at the University of Guam. Sea Grant emphasizes applied ocean-related research, education, and extension services. Over the years, Sea Grant has supported a great deal of valuable coastal research and development programs including: aquaculture, fisheries assessment, environmental planning, and pollution monitoring. However, most research and programs have been carried out in Hawaii. Although University of Hawaii and University of Guam researchers can apply for and have received grants for projects in the United States possessions and the TTPI, little has been funded to date. The author has on occasion recommended funding of a coastal research program for the former TTPI region. To date, there is little enthusiasm for this because of perceived lower priority of research outside Hawaii, dwindling levels of Sea Grant funds, the immensity of the study area in Micronesia, and the disappointments of previous Sea Grant-sponsored aquaculture development grants in Pohnpei. A small amount of Sea Grant funding contributed to the development of a management plan for Pohnpei's coral reef resources (in press by Paul Holthus). If the final product is well-received and the needs of the TTPI are better argued, it may be possible for either the University of Hawaii or the University of Guam to fund more projects in the Carolines and Marshalls under Sea Grant.

PEACE CORPS

For many years, Peace Corps volunteers have made significant contributions to the welfare of the islanders within the TTPI, the only "eligible" U.S. Pacific area under the Peace Corps charter. From time to time, marine biologists, fisheries specialists, sanitary engineers, and planners are assigned to the districts. They provide on-the-job training of TTPI workers and officials or educate the islanders in the classroom. The Peace Corps program will presumably continue in the region after ratification of the Compact. If not, it should be legislatively made to do so. Despite decades of United States administration, the former TTPI are still developing countries not much better off than the scores of other developing nations serviced by the Peace Corps.

OMNIBUS LEGISLATION

From time to time, EPA has provided funds for water pollution and hazardous waste clean-up programs in the TTPI. These problems are important enough to merit greater funding, whether via omnibus acts or other legislative means.

SUMMARY

A number of important environmental laws will no longer apply to the Marshalls and Carolines after ratification of the Compact, and there has been no action to date to develop future counterpart laws. Coastal zone and coastal resource management has been essentially nonexistent in the Marshalls and Carolines. The small number of scattered programs involving resource inventories have been important but incomplete contributions to the development of comprehensive coastal resource plans for the region. Waste management and clean-up programs in the TTPI, mostly administered by EPA, will no longer be eligible for funding after the Compact is ratified unless specific provision is made for them. This is strongly recommended as is expansion of the Corps DERA and Section 22 programs, with greater funding and reduced restrictions. Coastal management legislation is among the TTPI's greatest needs.

THE INSTITUTIONAL ARRANGEMENT FOR FUTURE CRM PROGRAMS IN THE FORMER TTPI

The possible roles of a variety of organizations and levels of government in administering or assisting in future CRM and related programs are listed below. Analysis is confined to the Marshalls and Carolines.

1. International Organizations (including nonprofit institutions).

United Nations Environmental Program.
South Pacific Regional Environmental Program.
International Union for Conservation of Nature.
World Wildlife Fund.
Pacific Science Association.
East-West Center (at the University of Hawaii).

(a) The above organizations and others could contribute technical expertise for the design of resource surveys and inventories, and for establishment of protected areas.

(b) They could also help to sponsor workshops and meetings to identify areas of particular concern, rare species; and help to draft policies and legislation on environmental protection and fish and wildlife preservation.

(c) The former TTPI could serve as a site for one of the future international congresses on coral reefs held every 3-4 years (the next one is scheduled for Australia in 1988).

2. United States Federal Agencies.

U.S. Army Corps of Engineers

(a) Planning, engineering, and construction management for public works (ports, airfields, roads, water supply, hydropower, shore protection, flood control projects).

(b) Coastal resource inventories--design and management of studies.

(c) Counterpart environmental and coastal resource management legislation.

(d) Clean-up of hazardous waste, debris and unexploded ordnance.

U.S. Fish and Wildlife Service

(a) Fish and wildlife surveys.

(b) Design of wildlife refuges.

(c) Counterpart legislation on endangered species.

National Marine Fisheries Service

(a) Fishery and marine resource surveys.

(b) Marine endangered species counterpart regulations.

Office of Oceans and Coastal Resource Management (NOAA)

(a) Coastal resource management legislation.

(b) Federal administration of future CRM grants to the TTPI.

(c) Establish marine sanctuaries.

U.S. Environmental Protection Agency

(a) Wastewater construction grants.

(b) Safe drinking water programs.

(c) Establish innovative and applicable solid waste management programs.

(d) Superfund continuation.

(e) Counterpart laws and procedures for control of water pollutants and hazardous waste.

Advisory Council on Historic Preservation

(a) Counterpart legislation on historic preservation.

(b) Technical assistance in establishing historic preservation programs.

National Park Service

(a) Technical assistance in establishing historic preservation programs.

(b) Advisory assistance on significant historic sites, monuments, memorials, and parks.

U.S. Department of Agriculture

(a) Development of forestry and related conservation programs.

(b) Technical assistance for copra, peper and other potential cash crops.

(c) Soil erosion control program assistance.

Sea Grant Programs (Universities of Hawaii and Guam)

(a) Grants and programs on research and development for coastal resources development and conservation.

(b) Educational and extension services.

(c) Publications assistance.

U.S. Geological Survey

(a) Completion of water resources surveys

(b) Continued or expanded monitoring of streams and groundwater.

U.S. AID. Although not now involved in the TTPI, the agency has considerable expertise in agriculture development training, research, and institution building in developing countries that may be applicable to the TTPI.

3. United States Congress

(a) Pass CRM legislation for the TTPI.

(b) Extend wastewater construction grants, safe drinking water, solid waste and hazardous waste management legislation to the TTPI beyond the Compact.

(c) Expand authority and funding for planning assistance to states (Section 22).

(d) Expand authority and funding of Defense Environmental Restoration Program.

(e) Authorize legislation to establish a task force and work groups to develop counterpart environmental legislation in cooperation with emerging nation counterpart officials.

(f) Expand Sea Grant funding for use in the TTPI.

(g) Establish grants or educational programs to develop or upgrade college-level institutions.

(h) Establish a small projects civil works authority (Capital Improvement Program) that would focus on the needs of the outer atolls.

4. Insular Government Agencies (RMI, FSM, RB)

(a) Develop and manage CRM programs with outside technical assistance (planning, CRM or marine resources).

(b) Establish land-use plans and controls.

(c) Local training (Planning Office) and construction operation of public works projects (Public Works, Transportation Authority, Ports Authority).

(d) Renewable resources management, enforcement against illegal fishing techniques, conservation of subsistence resources, protected reserves (Marine Resources and Fisheries).

(e) Historic preservation program and procedures (Territorial Historic Preservation Office).

(f) Establish or upgrade colleges and research centers (College of Micronesia, research labs).

(g) Establish an environmental protection agency that could also possibly serve as the lead CRM agency (TTPI ansd local offices of environmental protection boards).

(h) Develop commitment and support for CRM, counterpart environmental laws (legislators, Governors, and President).

5. Private Industry

(a) Participate in economic development planning for: commercial fisheries; tourism; aquaculture; diversified agriculture; and handicrafts.

(b) Contribute funds for planning and development of specific projects (including resource and environmental assessments).

6. Academic Institutions (Also refer to Sea Grant under No. 2)

(a) Resource inventories, fisheries assessments, research and development.

(b) Sea Grant program (applied research, education, and extension services).

(c) Technical assistance on upgrading/establishing insular colleges and research stations.

(d) Consultant and advisory assistance in the evaluation of specific development proposals.

(e) Training and education assistance.

(f) Publication assistance.

(g) Loan or dedication of research equipment, manuals, and reference materials.

(h) Public involvement and extension and outreach projects, including preparation of training and educational packages.

7. Traditional, Indigenous Organizations

(a) Identification of uses, values, functions, and location of traditional resources.

(b) Recommendations for CRM plan components procedures, review, and public input.

(c) Recording of cultural history, including lore on use and conservation of marine resources.

(d) Subsistence resource area management.

(e) Review of economic development proposals and land-use changes.

(f) Research and development on renewable (including aquatic) resources.

(g) Design and siting of ports, roads, airfields, and other construction projects that may affect cultural and natural resources.

(h) Liaison agents and advisory groups which provide periodic evaluation and suggested revisions to CRM policies and activities.

CONCLUSIONS

I believe the sum total of the suggestions and recommendations in this report will be positive. In particular, the emerging nations of the Caroline and Marshall Islands will be better able to control and promote economic development, accommodate increased population and its redistribution, conserve natural resources of value for subsistence and economic development, and minimize the adverse consequences of construction, waste generation, and disposal practices.

The history of more highly developed areas under United States control (Hawaii, Guam, and Northern Marianas in particular) suggests that continued haphazard growth, urban drift, and misuse or overuse of renewable resources will continue to irretrievably modify the natural and cultural (especially subsistence) resources of the islands. The islanders should be given control of their destiny as rapidly as possible and equipped with appropriate levels of financial and technical assistance and expertise for: planning, program management, design of studies, development and conservation programs, training, and education.

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TABLE 1. SELECTED SOCIOECONOMIC AND RESOURCE CONSERVATION ISSUES OF IMPORTANCE MERITING HIGH PRIORITY IN FUTURE CRM INITIATIVES IN THE TRUST TERRITORY OF THE PACIFIC ISLANDS

I. SOCIOECONOMIC ISSUES

A. OUTER ISLANDS

1. Population density and out migration.
2. Conservation of subsistence lifestyles.
3. Small dock and airfield development.
4. Water supply and catchment facilities.
5. Copra industry.
6. Other cash crops and handicraft.
7. Commercial fishing.
8. Tourism management.
9. Aquaculture development.

B. URBAN AND DISTRICT CENTERS [Majuro, Kwajalein, Leluh, Kolonia, Truk, Colonia, Koror]

1. Population growth, immigration, and redistribution.
2. Land ownershiip disputes.
3. Land-use planning and management.
4. Water supply and quality.
5. Self sufficiency in energy generation.
6. College and university facilities or assistance.
7. Agricultural and aquaculture development.
8. Tourism management.
9. Controls over landfilling for houselots, and other residential and urban uses.
10. Commercial fishing, facilities, and permits.

II. CONSERVATION OF NATURAL RESOURCES

1. Conservation of subsistence resources.
2. Historic preservation.

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TABLE 1. SELECTED SOCIOECONOMIC AND RESOURCE CONSERVATION ISSUES OF IMPORTANCE MERITING HIGH PRIORITY IN FUTURE CRM INITIATIVES IN THE TRUST TERRITORY OF THE PACIFIC ISLANDS (CONT)

II. CONSERVATION OF NATURAL RESOURCES (CONT)

3. Protection of endangered and threatened species (including marine turtles, forest birds, etc.).
4. Fishing with explosives and poisons.
5. Landfilling of important coastal habitats.
6. Water pollution and degradation of important habitats.
7. Controls over dredging, filling and construction in coastal waters.

III. WASTE MANAGEMENT

1. Wastewater and sanitation facilities.
2. Solid waste control and management facilities.
3. Cleanup of hazardous materials and war explosives and debris.
4. Contamination from nuclear testing and oil pollution.

TABLE 2. RECOMMENDED PLANNING AND MANAGEMENT TECHNOLOGIES TO ADDRESS CRM ISSUES IDENTIFIED IN TABLE 1

I. Public meetings, hearings and workshops to evaluate possible needs for CRM in the TTPI.

II. Legislative endorsement and commitment to CRM by legislatures of emerging new countries.

III. Administrative reorganization to establish a CRM lead office or agency in each new country.

IV. Coastal resource inventories of valuable resources and their uses (using completed Pohnpei inventory as a model).

  A. District Centers - first priority.

  B. Outer Islands - 2nd priority.

V. Draft CRM plan development.

VI. Public review and final CRM plan approval.

VII. Implementation of approved plans.

  A. Promote economic development.

  B. Promote conservation of important resources.

  C. Waste management.

  D. Research and management of areas of particular concern.

  E. Others. Development of institutions or facilities for higher education and research.

VIII. Education and training programs on CRM within each new country.

IX. Publications and telecommunication of CRM activities (in native languages) to outer islands and district centers.

Background Paper No. 3

TOURISM DEVELOPMENT AND SUSTAINABLE RENEWABLE RESOURCES MANAGEMENT FOR U.S.-AFFILIATED PACIFIC ISLANDS

by

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1986

Prepared for

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ABSTRACT

Since 1960, tourism in the Pacific Basin has shown the fastest growth of all tourism regions, reflecting an initially small base, improved infrastructure, increased accessibility by air and sea, and the growing interest of travelers. U.S. Pacific islands show potential as tourist destinations because the islands offer a remote setting and have beautiful attractions and romantic appeal.

The tourist industry could provide substantial economic and social benefits such as job opportunities for unskilled labor and women, recreational opportunities for residents, improvement of infrastructural services, as well as increased foreign exchange earnings. However, tourism may not be an economic panacea due to environmental requirements and negative socio-cultural impacts. Tourism development on high islands can be constrained by: the lack of reliable, inexpensive, frequent air service; a lack of developable land for transportation and facilities development; insufficient infrastructure; a reliance on imported foods, materials, and energy; the lack of trained personnel; and the disinterest by residents for jobs not in the public sector.

Despite potential negative factors, tourism can be integrated into the U.S. Pacific islands' economies through the local governments' direct involvement in planning and setting of objectives, management and program review. As a start, tourism managers should ask themselves these questions:

What type and how many tourists should be sought?
Where should tourism be located?
How concentrated or integrated should these developments be in the community?
How large should the industry be?
What resources must be committed?
What are the local attitudes toward tourism and tourists?
What are the "opportunity costs"?
What products could be grown or produced locally for consumption by visitors?

Tourism managers will need to get away from simply looking at fixed resource capabilities, i.e., only looking at numbers of tourists or rooms or hotels. While most would agree that a high quality environment is a requirement and the basis of attraction to tourists, the quality of the environment can be threatened by tourism development itself. To minimize the possible impacts, tourism managers and government policy-makers could define the "limits of acceptable change," i.e., decide what environmental and social changes can and should be tolerated. Mechanisms suggested for integrating tourism into the economy and dealing with resources include: coastal zone management and land-use policies, strong tourism agencies and policies, market identification and diversification, regional cooperative promotion and studies, and the development of educational and extension programs.

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INTRODUCTION

The rapid growth of international tourism in the 1970s and 1980s has made it second only to oil as an item in world trade (World Tourism Organization (WTO), 1982). Contributing factors include: (1) expanding populations in the generating countries; (2) desire to "escape" urban areas; (3) desire to "experience" new places, people, things; and (4) increased leisure time, longer vacations, and more income (Bergerot, 1979; Edwards, 1979; Carlson, 1980; Organization for Economic Cooperation and Development (OECD), 1980; American Society of Travel Agents (ASTA), 1981; Edwards and Cleverdon, 1982; Mathieson and Wall, 1982). Factors which affect the supply side of tourism include improved promotion and communications, the development of resort areas and facilities, political relations with source countries, and health of the world economy. Other factors are discussed in International trade in tourism: a manual for managers and executives (Edgell, 1985) (available from the Office of Policy and Planning, U.S. Travel and Tourism Administration, Department of Commerce, Washington, D.C.). However, the key factor in the growth of world tourism has been the rapid improvement and reduced real costs in air transportation (OECD, 1980).

Since 1960, tourism has shown the fastest growth in the Pacific Basin as compared to all other tourism regions. By 1984, total arrivals in the Pacific Area Travel Association (PATA) member destinations (without Hawaii) had increased from 1 million to 21.3 million (PATA, 1984). The Pacific islands are particularly suitable for tourism because the islands have beautiful attractions and romantic appeal. However, tourism in the Pacific is distinguished by vast stretches of ocean between destinations, and tourism has grown only in certain Pacific islands.

THE TOURISM DEVELOPMENT DEBATE, A REVIEW

Tourism can generate substantial social and economic benefits (Anon., 1984a). It has made significant contributions to social welfare by increasing the recreational alternatives for residents, by creating employment for unskilled labor and for women, as well as becoming for some countries the largest foreign exchange earner (OECD, 1980).

Tourism as an export industry. Tourism has been considered an invisible export industry because the "product" is bought within the country which produced it (OECD, 1980). As an export item, tourism has advantages over exports of primary products by allowing the "host" country (i.e., the country receiving tourists) to have a greater degree of control over the establishment of prices. Tourism diversifies the base of exports, and it has potential for producing foreign exchange to offset deficits created by growing demands for importation of raw materials and manufactured goods.

Tax contributions from tourism. Tax contributions from tourism can be beneficial to the local economy. Contributing sources include airport landing fees, exit or departure taxes, hotel room taxes, and taxes on other tourism-related activities such as taxis, restaurants and bars, etc.

Tourism has been welcomed by many developing countries as a panacea for economic problems, yet tourism development presents new challenges to those seeking political and economic independence, and often lower net foreign exchange earnings than anticipated. To properly plan the kind and level of tourism most desirable for any given area, it will be necessary to balance the economic benefits of tourism development with possible negative socio-cultural and environmental impacts. For example, see Biddlecomb's (1984) discussion on "The great tourism debate: does the host nation benefit?"

Infrastructural needs. In most cases, the provision of infrastructure (roads, airports, sewage, water and energy systems), all necessary for the comfort of visiting tourists, is the major requirement for tourism development. The provision of infrastructure could divert funds from other needed governmental activities. Futhermore, because tax incentives are often offered by host nations to attract hotel corporations, little money comes initially from the tourist industry to help the government pay for costly infrastructure improvements and maintenance. A time lag generally exists before the tourism industry can begin to produce revenues that host nations can tap for infrastructural development. Host nations generally pay for infrastructure with loans and aid program funds from overseas. This type of action could divert capital from projects more directed at local needs.

Susceptibility to outside influences. Dependency on tourism is risky. The seasonality of tourism can affect employment rates from season to season. Also, since tourist visits may vary each year due to world economic situations, such as airline strikes and recessions (Anon., 1980), host nations have little control over the actual numbers of arrivals and have less ability to predict how well the industry will do in a given year. For example, a 29-day strike by the Airline Pilots Association against United Airlines disrupted Hawaii's visitor industry and many other local sectors dependent on air freight services (Anon, 1986; Bank of Hawaii, 1985). Travel patterns exhibited in 1979 and 1980 indicate that stagflation, social and political disturbances, variations in currency values, and uncertainty about energy supplies can offset the positive effects of lower airfares, better accommodations and facilities, and stepped-up promotional efforts (ASTA, 1981; WTO, 1982).

Role of transportation. Transportation plays a critical role in the development of any tourist destination. In the Pacific islands the availability of transportation is often cited as the primary limiting factor in the development of an island's tourist industry (Pacific Islands Development Council (PIDC), 1978). First, the present technology, geography, and demography create difficult trade-offs, i.e., the distance between service points require large aircraft, but the lack of market populations prohibits reasonable operating cost structure (Pacific Basin Development Council (PBDC), 1985). Second, carriers, routes, and timetables change frequently; a successful tourism destination requires dependable, as well as frequent, air service. Furthermore, Pacific air service is primarily oriented towards the rim countries of North America, Asia and Australia and New Zealand, a situation which limits service to remote areas (ibid).

Local versus foreign development and management of tourism. For local residents, the degree of involvement in tourism has important implications. In general, the greater the degree of active involvement and control, the more beneficial local residents will perceive tourism (i.e., greater economic benefits), and the less likely impacts would be viewed as negative (Abbasi, 1979). Hostility among local people is less likely when locally-owned and operated tourism provides good jobs, not just menial employment (Pearce, 1981). However, management jobs are primarily filled by expatriate personnel rather than local people, possibly leading to frustration, as seen in Fiji and Palau (Macnaught, 1982), and Hawaii (Duerr, pers. comm., 1984). Britton (1982) suggests that the tourism industry in the Pacific is characterized by "dependency relationships which have developed between the host country and the countries which send the visitors, which control the airlines, the travel agencies, the hotel corporations and the cruise ships."

Land use and ownership. Tourism development may also raise (sometimes substantially) the value of land, and ownership may pass into the hands of the most economically powerful nationals and foreigners. In some cases, land may be withdrawn from other uses, such as agriculture, to serve tourism or associated residential development for tourism employees; the influence of tourism on agriculture is normally adverse (Winpenny, 1982). Tourism development along the coast may also impinge upon other water related activities such as port and fisheries development.

Rate of development. The slower the rate at which phases of tourism development succeed each other, the more likely the host population will evolve and adjust its expectations (Macnaught, 1982). Farrell (1974), in "The tourist ghettos of Hawaii," points out the undesirable consequences of rapid tourism growth — such as land speculation, increasing numbers of newcomers, development of "golden ghettos" in the resort areas, and erosion of the "aloha spirit." Farrell (1982) also points out the need to establish a "carrying capacity" to maintain quality recreational use.

Environmental impacts in general. Concerning environmental impacts, research has centered on the basic dilemma that "...tourism depends heavily on an attractive and unspoiled environment but at the same time development of infrastructure to support the tourist invariably transforms this environment" (OECD, 1980). On the one hand, a high-quality environment is essential for tourism; on the other hand, the quality of the environment can be threatened by tourist development itself. OECD (1980) surveys show that, irrespective of country or region, the main deciding factors of tourism are: 1) attractiveness of the landscape, 2) climate, combined with clean air, clean water and a restful atmosphere, 3) the cost of the holiday, and 4) the region's intrinsic qualities (including local foods and culture), and various other factors.

Impacts of tourism on the environment listed by OECD (1980) are:

(1) air pollution due to motor traffic and to the production and use of energy, water pollution of sea, lakes, rivers, springs due to discharge of

untreated waste water and solid waste, litter, and noise pollution;

(2) loss of natural landscape, agricultural and pastoral lands for use in tourist housing, facilities and infrastructure, and loss of public access;

(3) destruction of flora and fauna by pollution and trampling and excessive access to and use of natural sites;

(4) degradation of landscape and of historic sites and monuments;

(5) congestion and traffic;

(6) conflicts and competition for space.

Cohen (1978) in "The impact of tourism on the physical environment," notes that the worst environmental effects of tourism occur in "special environments" particularly attractive to tourists, such as small islands and coral reefs. The resource base of these special environments is particularly vulnerable to demands for land, fresh and agricultural water, and waste disposal (McEachern and Towle, 1974). As Pearce (1980) noted, environmental concerns have economic significance since the natural environment provides a prime motivation for travel to Pacific islands. Tourists are attracted not just by the mere beauty but also the native flora and fauna which are attractions in themselves.

Waste disposal. Many researchers point out a wide range of environmental concerns relating to tourism and recreational use of natural resources (Wall and Wright, 1977; Dahl, 1980). For example, waste disposal, especially for major developments, can be a special problem if effluents are discharged into mangroves or lagoonal areas which have limited circulation. Some Pacific areas, such as Pohnpei (Ponape), already have sewage problems despite a small tourism industry.

Fresh water needs. Depending upon the type of facilities made available, potable water requirements could vary from 100 to 500 gallons per person per day. The lower limits are associated with a minimum of development. The upper limit would be associated with large resort developments with extensive landscaping, golf courses and swimming pools. High volcanic islands would be more likely to have greater sources of groundwater and rainfall than low islands (Miller, pers. comm., 1985). However, many of the high islands already face inadequate or underdeveloped sources of surface or ground water. A prime example is the Commonwealth of the Northern Mariana Islands (CNMI) (U.S. Department of Commerce, 1980; Groves, 1985).

Other resource concerns include exposure to coastal hazards such as tsunami, typhoons, coastal flooding; destruction of mangrove and wetland areas; loss of historic sites; and loss of traditional shoreline access for the residents in areas set aside for tourism development.

In summary, Mathieson and Wall (1982) concluded that tourism research to date has primarily focused on economic impacts, which have largely been shown to be beneficial, that social impacts were found to be mainly undesirable, and that environmental impacts were found to be mixed (ibid). The indications are that tourism will continue to grow, with the result that the pressure on the host society and the environment will be still greater. It has been argued that these latter impacts of tourism on a host country are primarily a concern and responsibility of government (Jenkins and Henry, 1982), since private sector involvement is likely restricted to financial and economic considerations.

TOURISM DEVELOPMENT ALTERNATIVES FOR U.S. PACIFIC ISLANDS

> From the human point of view, oceanic islands were worlds set apart. Until their isolation was broken down by more-or-less regular sea and air transport their inhabitants had to be self-sufficient, relying upon what the local environment could produce in the way of food, fuel, and other necessities of life.... Islands were not then, as they are tending to become now, mere adjuncts of a larger and ultimately world-wide system of exchange and trade.... <It> must be recognized that their romantic aspect to the Western mind, and the resulting appraisals of remote islands as places offering visitors a range of experiences unobtainable in continental lands, is having a profound effect upon the uses of islands by mobile continental peoples. (Wace, 1978)

Status of Tourism Development

Sources of tourism statistics for U.S. Pacific islands

Assessment of the trends and existing status of tourism statistics for the U.S. Pacific islands is hampered by the lack of consistent, standardized information and the scattered location of information among a myriad of sources for the different island groups. Table 1 summaries major sources and types of information available for analysis; Appendix A contains an annotated list of these sources. What table 1 does not indicate is the fact that while categories of information may be similar, the treatment of the information may not be. For example, a listing of visitor arrivals for Micronesia may include FSM, along with Guam, Saipan, or both, depending upon the source and the year. Also, arrivals may lump various trip purposes such as business, pleasure and transient or not distinquish between air and sea arrivals.

The Pacific Area Travel Association (PATA) annually compiles one of the more complete and detailed compendiums of statistical information on tourism. Information categories include: visitor arrivals, geographical origins, existing and proposed hotels, and numbers of rooms. However, PATA only reports data for member countries. Thus, their statistics do not separate out Saipan or the Federated States of Micronesia from "Micronesia", nor do they cover Palau or the Marshalls.

TABLE 1. Summary of tourism statistical sources for the U.S. Pacific islands.

SOURCE	AMER. SAMOA	GUAM	MICRONESIA FSM	TRUK	YAP	PONAPE	KOSRAE	MARIANAS NORTH. MARIANAS	SAIPAN	TINIAN	ROTA	MARSHALLS	PALAU
Asia Travel Trade	A,C	A											
ASMAL Pacific Rpt.		A,B											
A. Samoa Tourism Office	A,C												
FSM Pohnpei statis. off. Truk statis. off Yap statis. off			A,B	A	A	A	A						
Guam Visitors Bureau		A,B, C,D											
International Tourism Quarterly	A,C												
JAPAN TRAVEL BLUE BOOK		A,D							D				A
JNTO		A,D											
Marianas Visitors Bureau													
PATA	A,B	A,B	A										
U.S. DEPT. OF STATE (Annual Rpt to UN)			A,B	A,B	A,B	A,B		A,B				A,B	A,B,C
WTO	A,B							A					

A = Total arrivals B = by geographical origin C = by purpose 4= Japanese travellers

U.S. Pacific Islands Tourist Market Areas

In 1984, Micronesia (including Guam) had 1.9% of all arrivals in Pacific Area Travel Association (PATA) destinations (including Hawaii) as compared to Hawaii which had 18.6% (PATA, 1984) (Table 2). An interesting aspect of travel to the Pacific islands is that the island areas cater to distinctly different markets. When the islands are grouped into regional subareas, the importance of certain markets to specific subareas becomes apparent. The Hawaiian Islands attracted 65% of all its visitors from the U.S. while Micronesia, including Guam and the Commonwealth of the Northern Marianas (CNMI), attracted 82% of all its visitors from Japan (ibid). Western Pacific and South Pacific islands attracted many of their visitors from Australia, New Zealand and other Pacific islands (ibid).

Guam, Saipan, and A. Samoa share several characteristics which have influenced their pace of tourism development (UH/STIM, 1983):

1. relatively small amount of land area;
2. tropical climate with tourist attractions such as beaches and natural scenery, but few other resources with economic development potential;
3. farthest U.S. territories from the U.S. mainland, making them more favorable tourist destinations for their foreign neighbors, e.g., Japan;
4. large indigenous populations with cultural traditions which still inhibit acceptance of tourism employment as a viable option for earning a living (Kent, 1981; Kiste, 1983; UH/STIM, 1983).

Unlike A. Samoa, tourism is the largest private economic sector in Guam and Saipan; government employment, however, is the largest employer in all three.

Status of tourism development in selected areas.

Guam. The key to tourism development in Micronesia is Guam, as it is the major destination in the region, especially for Japanese tourists. Guam's tourist industry had its modest beginnings in 1962 when President Kennedy relaxed security clearance requirements. In 1967, Pan American began Japan-Guam flights and Japan relaxed travel and foreign exchange restrictions for its

Table 2. Recent information on visitors, hotel rooms, and tourism plans

LOCATIONS	INFORMATION SOURCES	VISITORS (year)	EXISTING ROOMS	PLANNED ROOMS	TOURISM BUREAU/	/PLANS	ECONOMIC PLANS
Guam	PATA, 1984	361,423 (84)	3,018	950	GVB	Tumon Bay	Annual economic plans prepared
Saipan	MVB, 1985 Groves, 1985	131,823 (84)	983	1000	MVB	requested	"
FSM	PBDC, 1986	15,952 (81)	251	(a)	yes	--	5-Yr Indicative Plan, 1985
POHNPEI	MRTC, '81,'83(c)	6,412 (82)	122 *		state office		(some individual state 5-Yr Indicative Plans printed in 1985)
KOSRAE	PBDC, 1986	684 (81)	19 *				
TRUK	Anon., 1985	4,300 (83)	84				
YAP	PBDC, 1986	1,234 (81)	26				
PALAU	"	7,005 (82)	93 (b)				MAYBE soon
MARSHALLS	"	3,503 (79)	215				
A.SAMOA	PATA, 1984	19,403 (84)	206		yes	--	Annual economic plans
HAWAII	PATA, 1984	4,856,000 (84)	65,919 (85)		HVB	yes	State functional plans (12 areas)

a) contact Enricia Mailo, FSM tourism specialist at FSM Government, Kolonia, Pohnpei.
* number of rooms expanded greatly in 1985, Contact Mailo for 1986 data.

b) prior to large new hotel constructed in 1985 (figures unavailable at present)

c) MRTC, 1981 data has better breakdowns of data than the 1983 report citizens (Lee et al, 1978). Until 1974, Guam's industry was growing so rapidly that hotel construction could barely keep pace, a "boom" period when arrivals jumped from about 1,400 to over 240,000 between 1960 and 1974 (Boeing, 1975). Then in 1974, the oil crisis, inflation and worldwide recession slowed growth considerably for the next few years (Mak and Miklius, 1977).

Guam's tourism is based on ready access to the Japanese market (i.e., number of air routes and number of flights, and cheap fares), hotels and other infrastructure, convenient shopping, and numerous activities (Wilson, 1985). The majority of the Japanese visitors make no other stops on their itineraries and stay between 3-6 days (PIDC, 1978; Cruys, 1982; Guam Visitors Bureau, 1982), a brief stay by international standards (Harris, et al, 1973; Mak and Miklius, 1977), although similar to the stays at Caribbean destinations. For the U.S. market, is a "multiple" destination, that is, part of a longer itinerary (ibid.). Some 5% of U.S. residents bound for Guam from U.S. gateways continued to some other U.S. Pacific island destination (Harris, et al, 1973; Cruys, 1982); similarly, a few Japanese travelers continue to other Micronesian destinations such as Truk (PATA, 1977; Cruys, 1982).

Guam leads the U.S. Pacific islands (excluding Hawaii) in not only tourism development (about 3018 hotel rooms in 1984) (PATA, 1984), but also in long-range planning; the Tumon Bay Master Plan and Ten-Year Visitor Industry Plan 1982-1992 were developed to guide future growth (UH/STIM, 1983). Constraints to future growth include: infrastructure development not keeping pace with hotel construction; need for increased air traffic to keep pace with hotel rooms; and reliance on the Japanese market. Guam is now attempting to attract visitors from other Asian countries including Korea, Taiwan, Hong Kong, and the Philippines (ibid.).

Commonwealth of the Northern Marianas Islands. The second major tourist node in Micronesia is the island of Saipan in CNMI. With direct flights available from Japan, Saipan's "tourist boom" began in the mid-1970s. In 1984, the Marianas Visitors Bureau (MVB) estimated 79% of 130,000 total visitors came from Japan (MVB, 1985), up from 57% in 1977 (Carter, 1981). Tourism now brings in about $70 million in direct visitor spending in CNMI (MVB, 1985). Visits by U.S. citizens declined until 1984, reflecting the high costs of transportation from the U.S. mainland to CNMI and the phasing out of the U.S. Trust Territory Headquarters on Saipan (MVB, 1982; PATA, 1984). Few visitors venture beyond Saipan to the other inhabited islands of CNMI, i.e., Tinian and Rota.

Rapid tourism growth in Saipan has resulted in an overburdened infrastructure and unregulated building construction due to lack of zoning regulations (UH/STIM, 1983). Some relief has been provided through the CNMI Coastal Resources Program and the preparation of the Saipan Land Use Management Plan (SLUMP) (Groves, 1985). Constraints to future development include: availability of direct air flights to Saipan; reliance on the Japanese market; competition with Guam; and limited water supply. Like Guam, the MVB plans to increase promotion efforts in Hong Kong, Taiwan, Singapore, Korea, and the U.S. mainland. The MVB will seek higher-income tourists and offer them greater varieties of activities and attractions such as botanical gardens, lagoon tours, diving, and water sports (UH/STIM, 1983). While no tourism plan is presently available, the MVB hopes to develop one in the near future (MVB, 1985).

Federated States of Micronesia, the Marshall islands, and Palau. Although policy statements found in reports such as "Creating a destination area" (U.S. Dept. of the Interior, Territory of the Pacific Islands (TTPI), 1969) were prepared for some areas of Micronesia as far back as the 1960's, the relatively remote islands of Micronesia are considerably less developed than the islands of the Marianas chain. For example, Truk in the Federated States of Micronesia (FSM) had two hotels with about 84 rooms total in 1982; in that year, Pohnpei (Ponape) of FSM only had 122 existing rooms but two new hotels were under construction in 1985 (Takeuchi, 1984). See Table 2 for a comparison of hotel room counts in FSM as of 1982.

In 1981, only 20,981 visitors were recorded for Belau and FSM combined (Micronesia Regional Tourism Council (MRTC), 1983; PBDC, 1986). Tourism was generally on the increase throughout Micronesia, except for Truk. Between 1979 and 1983, the number of visitors to Truk fell from 6075 to 4300 due to a cholera epidemic and associated publicity; it appeared that the downward trend was reversing in 1984 (Anon., 1985). Unlike Guam and Saipan which are dominated by the Japanese market, the rest of Micronesia attracts visitors mostly from the U.S. (PATA, 1977; MRTC, 1983; PBDC, 1986). However, in 1985 Pohnpei approved operations of the Canadian cruise ship "Thorfinn" in their waters (Ashby, 1985); other FSM states are also considering the operation of the ship in their areas.

Tourism continues to increase in FSM "despite a lack of organized programs" (Ashby, 1985). All areas, except the Marshalls, have some sort of tourism office, specialist, or bureau within the government. Tourism related policies can be found in the Indicative Plans prepared for the various island groups (Table 2).

American Samoa. A. Samoa's tourism industry is still in the "infancy" stage with one major hotel, the "Rainmaker" (about 200 rooms) and few tourists. It received 19,403 visitors by air in 1984 (PATA, 1984). Although tourism development is a stated goal of the A. Samoa government, the anticipated volume has never materialized. Constraints to development include: international competition with Tahiti and Fiji; declining air service; lack of interest in tourism related employment by the local populace; lack of beaches; and deterioration of facilities (PIDC, 1978; UH/STIM, 1983; Choy, 1984).

Japanese tourists in Micronesia.

4.7 million Japanese traveled overseas in 1984, 82% for pleasure (Japan National Tourist Organization (JNTO), 1985). Of that total, about 10% visited Guam and Saipan. Guam and Saipan's five major competitors in the Pacific together attracted about 63% of all Japanese overseas travelers: Hawaii (17.1%), Taiwan (13.4%), Hong Kong (12.4%), Korea (12.3%), and Singapore (7.9%) (JNTO, 1985). Guam and Saipan tend to attract young honeymooners, young males, and "office ladies" more than other higher-spending segments; these segments continue to be the mainstays of the Guam/Saipan industry (Hawaii International Services Agency (HISA), 1983; Travel Journal International, 1985). Group travel, according to Jacobs (1985), will continue to remain popular for Japanese travelers due to reduced cost and ease of travel for those who do not speak foreign languages. However, FITs (free and independent travelers) are becoming common as more Japanese travelers — particularly repeat travelers — gain confidence in overseas travel. Jacobs observes that Japanese travelers are also branching out and seeking new destinations such as Australia. This means more competition for destinations such as Guam in the Japanese market area.

Air Service for the U.S. Pacific Islands

The Pacific Islands have been served at various times by Continental, Pan American, American, Northwest Orient, Japan Airlines, All Nippon Airways, Quantas, Air New Zealand, and UTA French Airlines; these international carriers primarily provide air service between their respective countries and given Pacific islands. Within the Pacific Islands area, the principal regional air carriers have included: Air Nauru, Air Micronesia, South Pacific Island Airways, Air Pacific, Polynesian Airlines and Air Niugini. Local airlines have included Air Guam, Air Marianas, Aloha Airlines, Pacific Missionary Airlines, and Air Belau. (Annual updates on the air service carriers in the South Pacific is provided by Pacific Travel News.)

The desired and perceived needs in Pacific air transportation today are: increased frequency of service, larger aircraft size (primarily to make the long distances between the various island groups), and low cost of service (PBDC, 1985). The unfortunate fact is that these needs are not compatible. For example, the distances between service points require large aircraft, but the markets are insufficient to support frequent flights and operating costs usually rise with size. Studies indicate that the key to Pacific development is economic growth, but this growth cannot occur without better air service (PIDC, 1978; PBDC, 1985). A discussion of the constraints and opportunities for air service to the U.S. Pacific islands can be found in the technical document entitled Essential air service in the American Pacific islands (PBDC, 1985).

Tourism Development — Types and Scale

Tourism Development Types

Although criteria vary, models of tourism development generally take into account the characteristics of the developers and the resource being developed, the manner in which the resource is developed, the context of development and its spatial organization (for a review of various models, see Pearce, 1981). The existing models highlight the fact that different processes of tourist development can and do occur. One model which seems particularly useful was proposed by Butler (1980). He suggested that tourist areas evolve through six stages:

1. Exploration — small numbers of tourists, who require no special accommodations, come to explore natural and cultural-historical features.
2. Involvement — increasing contact between residents and visitors and some facilities are provided exclusively for or primarily for visitors.
3. Development — increasing external influence on tourist infrastructure and attractions; heavy advertising; numbers of tourists may exceed the total population; institutionalized tourists are attracted.
4. Consolidation — rate of increase in visitors decline, but total numbers still increasing and tourism becomes major economic sector; marketing and advertising are wide-reaching in effort to extend visitor season and market area; major franchises and chains present, but few additions made; some opposition and discontent among locals.
5. Stagnation — numbers of visitors peak out and capacity levels reached with heavy dependence on repeat visitors, conventioneers; low occupancy.
6. Decline/Rejuvenation — area slides downhill to become a tourist slum, or recovers through creation of new attractions.

Although a natural progression is implied in this model, actual development may skip one or more stages. It should be emphasized that Butler's model offers a conceptual framework for describing a tourism development "cycle." However, there are exceptions in terms of the sequences of stages and coexistence of two or more phases. It might be helpful to view Butler's "stages" as "types" of tourism development which can be associated with a given destination.

With respect to the U.S. Pacific Islands, Hawaii could already be characterized by type 4 or 5 development with visitor counts approaching five million visitors a year and increasing local discontent with new hotel developments. Guam and Saipan may be in type 3 or 4 development, but are beginning to attract type 1 visitors. American Samoa and the remainder of Micronesia are probably in type 1 or 2 development.

Tourist Types.

A convenient means for analyzing the relative impacts of tourism upon renewable resources is to examine the types of tourists attracted to a given area. Smith (1977) proposed seven types of tourists with associated numbers and adaptations to local norms:

TYPE OF TOURIST	NUMBERS OF TOURISTS	ADAPTATIONS TO LOCAL NORMS
Explorer	Very limited	Accepts fully
Elite ("Earthwatch"-type)	Rarely seen	Adapts fully
Off-beat ("off beaten path")	Uncommon but seen	Adapts well
Unusual	Occasional	Adapts somewhat
Incipient Mass	Steady flow	Seeks Western amenities
Mass	Continuous influx	Expects Western amenities
Charter	Massive arrivals	Demands Western amenities

This typology was based upon Cohen's (1978) classical model which dealt with whether the tourist is "institutionalized", that is, using programmed services of airlines, travel agents, and other organized infrastructure. The tourist types listed can be useful in evaluating the relative impacts of tourists on the local environment and community; it is also possible to roughly relate Smith's tourist typology with Butler's "stages" of tourism development:

PREDOMINANT TOURIST TYPE	TOURISM DEVELOPMENT Explor.	Involv.	Develop.	Consolid.	Stagnat.	Decline/ Rejuven.
Explorer	x					
Elite	x	x				
Off-beat	x	x				
Unusual		x	x		x	
Incipient Mass			x	x	x	?
Mass			x	x	x	?
Charter			x	x	x	?

Pearce (1982) recently reviewed various schemes for categorizing tourist types. All typologies suffered from one or more problems such as being tentative in nature, overlapping or being non-discrete. Pearce also developed

15 travel categories with associated behaviors and roles (e.g., exploitation, spiritual, pleasure-first, high contact, and environmental). The choice of tourism typology could be dictated by the need to categorize tourists according to the different impacts they create on the resources and residents.

Development Scale and Resource Use

Scale of tourism development can be related to tourist types coming to a given destination and its stage of development. Certain destinations may be limited in their development potential due to various constraints such as isolation from major air routes, lack of tourism resources, or local disinterest in development. Rodenburg (1980), in a study of tourism in Bali, identified three scales: large industrial, small industrial, and craft. "Large industrial" tourism is characterized by hotels and infrastructure meeting "international standards;" these require substantial investments in support facilities and residents adapting to the industry. The "small industrial" scale is associated with "economy class" hotels which market more directly with their guests, as opposed to retailers (e.g., agents); modest investments in hotels and infrastructure are required. "Craft" tourism includes "homestays" and small, independent operations largely run by local entrepeneurs.

As a given locale is dominated by one of Butler's "stages" of tourism development, the scale of development and types of tourists attracted can be characterized. A key question is, however, who decides what scale and what tourist types are appropriate? Should it be the multi-national corporation seeking profitable ventures, or the local government pursuing development that is appropriate to the environment and culture? If the scale of development exceeds the limits of change acceptable to the environment or community, a destination could quickly "peak out" and stagnate or decline in popularity.

Jenkins (1982) feels that "large scale developments are likely to be inevitable because of external economies of scale and market structures in international tourism, but that the consequences of such developments can be foreseen and therefore mitigated by appropriate pre-project planning." Some degree of tourism development must occur in order for a "destination" to be marketable and to be distinct in the eyes of the visitor. Gee (pers. comm., 1985) suggests that a tourism industry with less than 300 hotel rooms is too small, that more than 500 rooms is necessary for a convention market, but that more than 700 rooms is probably too much for most of the islands to support.

Location of development

An important consideration is whether tourism development should be matched in scale, economics and social norms to an existing community (integrated development) or developed in an isolated area (enclave development). Common features of integrated developments include:

(a) the unit scale of facilities would be smaller than in enclave projects.
(b) barriers to entry (i.e., investments) are lower.
(c) tourists may have different expectations from the tourist staying in international class hotels.

Enclave development characteristics are:

(a) tourism infrastructure is not intended to directly benefit residents.
(b) the site location is physically separate from an existing local community.
(c) the facility is used almost exclusively by foreign tourists.

Jenkins (1982) summarizes arguments for and against each type of development, as well as gives examples from the Pacific, Africa, Asia, and the Caribbean.

Facilities and infrastructure.

For areas such as Guam and Saipan which experienced explosive growth in less than a decade, hotel construction could barely keep up with tourist influx. On Guam as much as 2,600 new rooms could be required by 1990 to accommodate a 10% annual growth rate, representing an investment of $254 million. Although some believe Guam can handle doubling its hotel inventory in five years, some hoteliers are concerned that the necessary infrastructure including roads, water and sewer lines will not be adequate (UH/STIMS, 1983).

In 1985, approximately 1,000 additional rooms were either under construction or about to begin construction on Saipan; this would augment the existing 983 rooms (MVB, 1985). With increased tourism employment, as well as new employment in government and the military, a future population of 40,000 people has been projected. The electricity, water, sewer, and solid waste requirements would be substantial; for example 1.5 million pounds of solid waste (306,000 cubic feet) per week could be generated (Kelley and Penseyres, 1976).

Socio-cultural and Environmental Impacts

> Tourism is, of course, a world-wide phenomenon, but in small island territories, with small populations, its impact is crucial. It would be easy for small populations to be inundated with mass tourism which would radically change the existing way of life: economic structure, work and leisure habits, indigenous agriculture, traditional values and cultural patterns, socio-political structures and functioning of the family system (Rajotte, 1977).

Socio-cultural impacts

Pearce (1981) and Rajotte (1977) itemized some of the socio-cultural impacts which can result from tourism, including changes in: population/demography; political and social values; lifestyles and customs; consumption patterns (i.e., "demonstration effect"). Matthews (1978) also described the introduction of the "playground mentality among visitors and residents alike" in areas seen as "playground for the affluent metropolitan residents." This sort of tourism would be extremely difficult to promote in areas with strong religious traditions, such as Kosrae and A. Samoa.

Travis (1982), in reviewing works on cultural impacts of tourism, concluded that impacts vary according to the differences between the visitors and the visited, in terms of numbers, race, culture, or social outlook: "There may be several host cultures, as well as several tourist cultures represented at one place, at one point in time, so one cannot see cultural impacts, simply in monolithic terms of the 'host culture' and the 'visitor' culture.'" Rather, it is the critical scale, numbers, status, and attitudes of visitors to hosts, which create problems. In his review of relevant literature on social and cultural impacts of tourism in the Pacific, Macnaught (1982) discussed the implications for policy makers and community leaders. He concludes that since "literature on the social impacts of tourism is methodologically suspect, <it> does not provide a very helpful body of knowledge to decision-makers in the way of predicting social impacts specific to the development of tourism."

Environmental Concerns

The physical environment is clearly the basis of much of the <South Pacific> region's tourist appeal and to destroy that would be to remove the foundation of the industry. Particularly in a competitive situation, those areas suffering from environmental deterioration will surely lose out to other areas offering comparable but unimpaired attractions. From an environmental viewpoint, the resource base of small islands is such that the demands for land, water, and waste disposal generated by tourism make them particularly vulnerable to rapid, uncontrolled tourist development (Pearce, 1980). Pearce (1981) described various types of tourism-related stress upon the environment: construction and environmental modification; waste disposal; recreational activities; and population effects. Warner et al (1979), Yonge (1969), and Dahl (1980) are among many researchers who point out the wide range of environmental concerns relating to tourism: trampling, collecting of shells and corals; and disturbing birds and wildlife. In one study of the effects of trampling on corals, 18 traverses by individuals reduced coral cover (especially fragile types such as Acropora) from 41% to 8% (Woodland and Hooper, 1977). Johannes (1978) estimated that one live coral head was collected for each 230 visitors to Hawaii — equivalent to about 19,000 to 24,000 specimens in one year.

Waste disposal, especially for large developments, can be a special problem if effluents should be discharged into lagoons which have limited circulation. Baines (1977) examined the Natadola project in Fiji which was planned to have 3,000 rooms, a golf course, and a light industrial/commercial complex. The project would have generated 22,400 tons/year of solid waste which would have been dumped in a nearby mangrove swamp; water consumption was estimated at 21 million liters/day (5.5 million gallons/day).

The environmental impacts of tourism development, like socio-cultural impacts, depend on the specific environments and the particular types of development and activities involved. Cohen (1978) identified four factors which influence the environmental impact of tourism: intensity of tourist site-use and development; resiliency of the ecosystem; time-perspective of the tourist developer (i.e., long-term vs. short-term); and transformational character of tourist development. He concluded that:

> ...<environmental> impact is not a uniform one, but varies widely. It might be neutral, or even beneficial when tourists are spread over an extensive area, rather than concentrated on intensively used narrow sites; when the ecosystem of the tourist-site is resilient to external impact; and when tourist developers take a long-range view and do not manifest a marked inclination to transform the environment through their efforts to adapt it or to enhance it for tourist use.

Tourism Policy

The tourist "boom" in the Pacific has resulted in a new awareness of the economic development potential as well as the increased concerns about adverse impacts and lack of local benefits. Attitudes toward tourism are diverse in the Pacific — although there seems to be much sentiment toward avoiding another "Waikiki" or "following the examples of Guam and Saipan."

Almost 20 years ago, TTPI's economic development plan, also known as the "Nathan Plan" (Nathan, 1966 and 1967), called for rapid growth of tourism, which in turn would necessitate foreign labor and management. In contrast with the Nathan Plan of the 1960s, tourism was ranked third in priority in TTPI's Five-year Indicative Plan for the period of 1977-1982 (Carter, 1981); fisheries and agriculture were ranked ahead of tourism. The Five-Year Indicative Plan evaluated various economic development options for the period 1977-1982 in preparation for termination of the U.S. trusteeship. The theme of the plan was controlled growth which would provide maximum local benefits. <More recent plans (Table 2) have been developed but were not available to the authors during the preparation of this draft>.

"Crumbs of tourism." Uludong (1977) expressed disenchantment with how tourism development was proceeding:

> ...the tourist industry as it is being developed in the Pacific is not only economically expensive and wasteful, but also exploits, dehumanizes, and dislocates the lives of islanders as well. In the long run, because of the envy and resentment it creates in the local populations, tourism will bring about its own ruin as well as the destruction of Pacific communities. This is disastrous, not only to Pacific islanders, but also to the promoters of tourism — unless, of course, they are only in it for a fast buck.

Some of this disenchantment can be attributed to the domination of outside interests in tourism development. Le Fevre (1974) noted that:

> The new centres of tourism were all located on international world air routes and therefore had already established transportation routes for their visitors. This historical fact...is important in understanding the likely development of the industry. It also suggests that substantial economic forces lead to foreign domination of the industry at least in its early stages. These forces arise from the economics of operating large jet aircraft, the oligopolistic nature of the airline business and the marketing cartel of international air tickets.

He continues, speaking of the "crumbs" which Pacific islanders euphemistically refer to as their share of the benefits of tourism: "tourism planning in the main has been concentrated in the wrong place. It has been concerned with the marketing, selling and the town planning considerations of 'pretty' hotel developments. What we should be planning are the spin-offs, the externalities of how best to use our crumbs." Farrell (1978) concluded that ways must be found to recover more of the tourist dollar for residents and that control by locals is the main issue facing tourism development.

What should direct future tourism policy? Five major principles were once endorsed by the TTPI districts: (1) tourism should be developed gradually in stages; (2) it must be of maximum benefit to the local people; (3) it must share economic development with agriculture and fisheries; (4) business must be spread among as many local people as possible; and (5) visitors and residents alike must be well-educated regarding the tourism business and respect for local culture (PIDC, 1974). These principles appear to still be useful in the late 1980's.

TECHNOLOGIES TO PLAN AND ASSESS THE IMPACTS OF TOURISM DEVELOPMENT

Tourism Data

Tourism data is generally obtained by either (1) surveying the tourists — demand side, or (2) by surveying the tourist businesses — supply side (see Figure 1). Both in term of concepts and definitions, and in the practicalities of measuring tourist flows, there are, however, considerable difficulties in producing really reliable and useful data.

Most tourism data focuses on counting arrivals in the destination country, either at the border or at tourist accommodations (Edwards and Cleverdon, 1982). The first does not usually distinguish between short stay or transit travelers and those spending longer periods. However, reasonably simple tourist profiles can be compiled about lengths of stay, expenditures, tourist numbers and flows, for use in developing promotional campaigns and planning. The data should be used cautiously since the tourist responds by either intent at entry surveys or by recall at exit or through mail surveys. Surveys at tourist accommodations omit those staying with friends and relatives or non-tourist accommodations, e.g., condos. Additionally, these persons may be repeatedly counted as they move around the country.

Information on occupancy rates and financial flows from tourism establishments are considered to be more concrete and timely, as well as less costly to obtain (Liu and Var, 1979). Financial information enables one to trace capital flows between sectors in the economy, which is a fundamental consideration in determining "impacts" and distribution of benefits.

Tourist expenditures can also used for analysis. It is best to analyze tourism (income) growth at the origin rather than at the destination, i.e., in the host country; forecasting should be based on origins, not destinations. Unfortunately, many countries do not publish or collect information on tourist

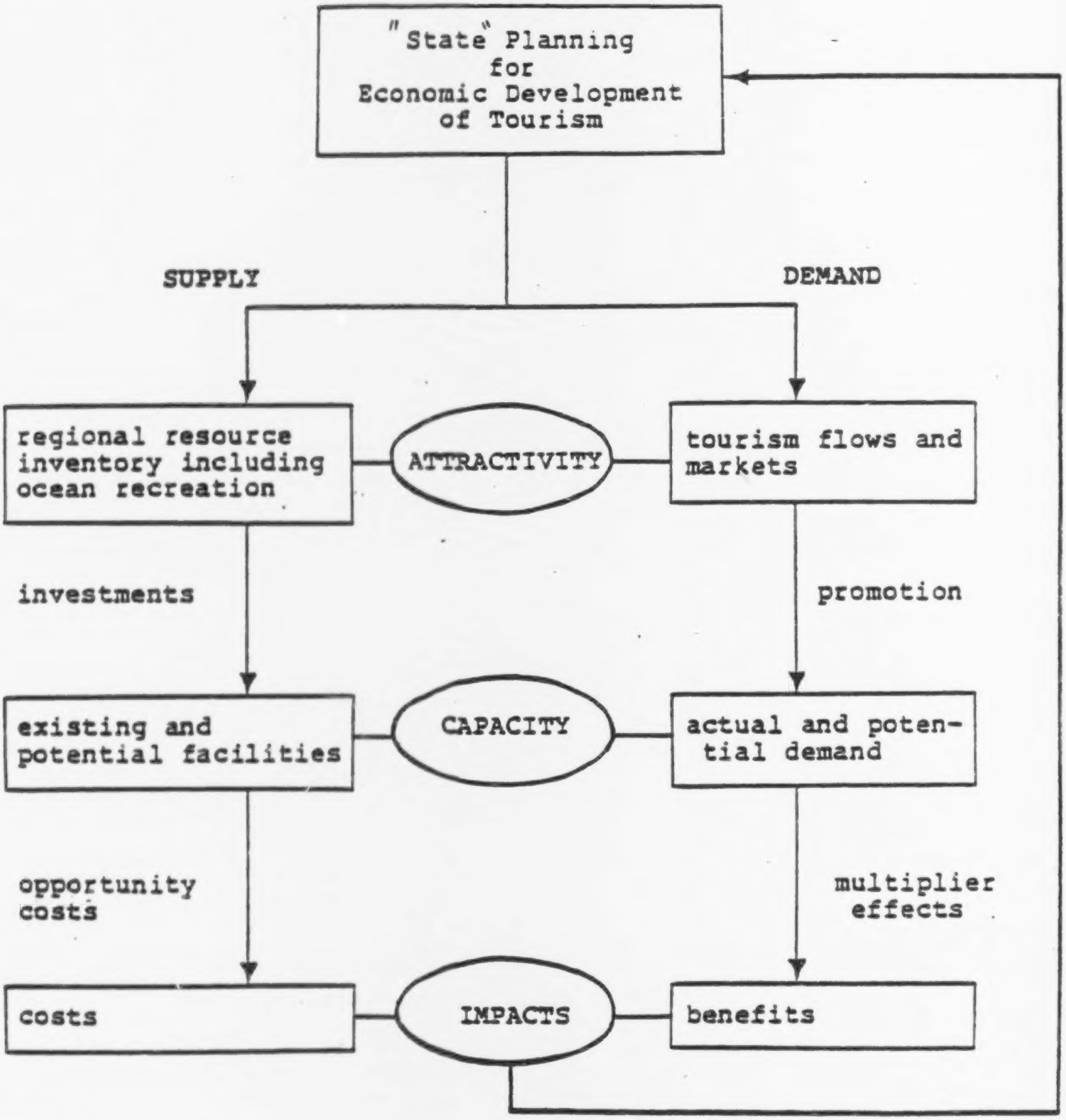
"State" Planning for Economic Development of Tourism
SUPPLY
DEMAND
regional resource inventory including ocean recreation
ATTRACTIVITY
tourism flows and markets
investments
promotion
existing and potential facilities
CAPACITY
actual and potential demand
opportunity costs
multiplier effects
costs
IMPACTS
benefits

Figure 1. Components of supply and demand model for state planning for economic development of tourism

expenditures abroad, far more have data on receipts (Edwards and Cleverdon, 1982). Another snag is that figures exclude international fare payments.

Developmental and impact analyses

Analyzing tourism development.

Factors which influence tourist development can be categorized in various manners and the importance of any one of the factors will depend on the type of development and especially on the scale of analysis.

Gunn (1979) proposed that tourism planning should consider five components:

(a) tourists - characteristics, markets, interests, cultural background, seasonality

(b) the attractions - climate and weather, recreational/historical/cultural features, natural resources,

(c) facilities and services - accommodations, food and beverage, retail, infrastructural support, distribution of services, labor availability

(d) transportation network - size and condition of routes, carriers, modes, access to sites

(e) information/direction - promotion, directions (on- and off-site), guides

Additionally, he suggested that these components be analyzed in terms of the socio-political factors such as attitude towards development, cultural disruption, etc.

Pearce (1981) concluded that methods for evaluating sites or regional resources generally followed these basic steps:

a) selection and weighting of criteria;

b) evaluation of sites or areas in terms of the criteria;

c) derivation of a relative measure of overall potential or attractiveness.

The evaluation of the tourist potential of an area is a complex task and one where methodologies could be further developed and refined. A key problem is the comparison and weighting of a wide range of parameters.

Assessing tourism impact.

In 1977 and 1978, the Organization for Economic Co-operation and Development (OECD) established a research program to investigate the need to maintain a sound environment and the mounting pressures from the expansion of tourism. A series of guidelines was prepared and a general research framework was presented (Appendix B) (OECD, 1980).

Three major sets of techniques for detailed analysis of the various impacts related to tourism development have been identified (Wall and Wright, 1977; Pearce, 1981): after-the-fact analyses, the monitoring of change through time, and simulation methods. Each has associated problems and advantages.

Of interest to the tourism planner and manager are the set of problems which have been lumped under the heading "carrying capacity" and which have generated considerable debate over the last decade. "Carrying capacity" measures the amount of use that an area of land can support on a sustained basis without destroying the resource base (Marion, et al, 1985). Although the literature is voluminous, very little progress has been made in actually implementing the concept. However, progress has been made in understanding why the concept has failed in the past. For example, research has found that the level of resource deterioration is influenced by amount of use as well as other factors such as type, location, and season of use (Marion, et al, 1985). Therefore, just limiting the amount of use is not the key. Attention should be shifted from fixed resource capabilities and the amount of use to "limits of acceptable change (LAC)," i.e., establishing the resource and social conditions desired in an area.

The LAC approach is not entirely new but rather was a response to the need of resource managers for a means to deal with increasing demands on wildland recreation areas. This latest step in efforts to improve resource management defines more explicit, measureable objectives. It is conceived as a dynamic, continuing process which can be applied to natural and social resources (Marion, et al, 1985; Shelby and Heberlein, 1984; Stankey and McCool, 1984); the concept should have many implications for managing resources for tourism development as well.

The keys to establishing the LAC conditions or limits are: (1) setting management objectives, (2) monitoring conditions, and (3) gearing management to meet the objectives (Table 3). As additional input into the determination of limits, Getz (1983) has identified six basic areas of analysis, including tangible resources (such as transportation links and availability of services), tolerance by the host population, satisfaction of visitors, evaluation of costs and benefits, systems analysis, rate of growth or change.

The challenge in determining limits is not of how to prevent any human-induced change, but rather one of deciding how much change will be allowed to occur, where, and the actions needed to control it. The LAC is a conceptual process, not policy. It requires field application by local managers who, through their experience with the locale and the social setting, modify it and improve upon the concept.

TABLE 3. The Limits of Acceptable Change (LAC) system (Stankey et al, 1985) (4 components broken down into 9 steps, each of which has a purpose, process, and product)

SPECIFICATION OF ACCEPTABLE AND ACHIEVABLE RESOURCE AND SOCIAL CONDITIONS, DEFINED BY A SERIES OF MEASURABLE PARAMETERS

STEP 1: identify area concerns and issues.
- legal guidelines
- organizational policy
- area-specific features and values

STEP 2: define and describe opportunity classes
- opportunity classes refer to subunits of an area which have different conditions

STEP 3: select indicators of resource and social conditions

STEP 4: inventory existing resource and social conditions

ANALYSIS OF THE RELATIONSHIP BETWEEN EXISTING CONDITIONS AND THOSE JUDGED ACCEPTABLE

STEP 5: specify standards for resource and social indicators for each opportunity class

STEP 6: identify alternative opportunity class allocations reflecting area issues and concerns and existing resource and social concerns

IDENTIFICATION OF MANAGEMENT ACTIONS NECESSARY TO ACHIEVE CONDITIONS

STEP 7: identify management actions for each alternative

STEP 8: evaluation and selection of a preferred alternative

PROGRAM OF MONITORING AND EVALUATION OF MANAGEMENT EFFECTIVENESS

STEP 9: implement actions and monitor conditions

MECHANISMS TO INTEGRATE TOURISM DEVELOPMENT WITH SUSTAINABLE RENEWABLE RESOURCE MANAGEMENT

Underlying any consideration of tourism development alternatives is the fact that most small islands have limited resources and potential for development. In the case of the U.S. Pacific islands, these constraints must be coupled with the realities of: heavy dependence on U.S. assistance and government employment; reliance on imported food, energy, and other critical goods; increasing populations, especially in the district centers; and depletion of resources. Although it is beyond the scope of this paper to prescribe specific directions for tourism development, a few suggestions are offered for consideration.

Coastal zone management and land-use controls.

In the study area, Guam, CNMI, and A. Samoa have approved Coastal Zone Management (CZM) programs. The CZM Program offers potential for balancing coastal development with protection of valuable resources. First, by strengthening planning staffs, review of proposed tourism development and long-range planning for areas of special concern (e.g., mangrove swamps, wetland, critical habitats, etc.) will be improved. Second, federal consistency review will help assure that federal activities — including permitting — will be consistent with local CZM objectives. Third, CZM programs can be instrumental in educating the public, as well as those in the tourism industry, about valuable coastal resources, management concerns, and the need for careful planning. Fourth, CZM programs should be able to help in the coordination of planning and review by local and federal agencies. Fifth, CZM funding — if continued by the U.S. — could help integrate tourism development objectives with CZM objectives.

A comprehensive zoning or land use program, in addition to or complementing a CZM-type program, will be necessary to maintain resource and cultural quality on the space-limited islands. Comprehensive land use laws and accompanying zoning codes may be necessary in order that development in general does not overload the islands, encroach on needed agricultural areas or watershed conservation zones, or overrun important biological production areas such as mangrove areas or fringing coral reefs. Such laws would serve to maintain some natural and scenic reserves which are complementary and critical to quality tourism (Gee, pers. comm., 1985).

Development of a strong tourism agency and policies.

The local governments should develop tourism offices and implement tourism policies and objectives, separate from the general Five-year Indicative Plans, which promote active government control and coordination over the tourism plant and services. The responsibility of the tourism offices could include guidance, coordination, and regulation of the industry, as well as collection and coordination of marketing, planning and evaluation. Governments may need to be aggressive and insist on joint ventures, substantial local shareholding and participation in tourism related companies as well as tax and license these operations.

Training of residents as tourism leaders is an important step in developing a strong program. Programs such as the intensive summer Executive Training Course at the University of Hawaii School of Travel Industry Management would aid local tourism managers in identifying issues and provide them with the basic framework for tourism development and management.

Develop a strong, committed, regional tourism association.

Several writers emphasize that tourism development in Micronesia requires a regional approach to establish a distinctive destination area (Rhonheimer, 1976; Bergerot, 1979). According to Bergerot, island markets require the strategy of marketing groups of islands, stressing "complementarity" rather than competition. Regional markets are more attractive for long-distance markets and broaden opportunities for longer stays, more varied activities, and more stops within the region (ibid). Therefore, a key to developing tourism in places such as Truk is to strengthen links among Guam, Saipan, and other Micronesian destinations. For example, diving tourism may be suited for regional promotion since Micronesia offers many excellent diving opportunities. Truk's most notable diving feature is its "ghost fleet" while other Micronesian destinations such as Belau, feature spectacular marine life.

Market diversification.

Due to the special vulnerability of island tourism to any perturbation in the world market (e.g., impact of United Airlines' strike on Hawaii's tourism industry in the mid-1970s and 1985), tourism planners should consider diversification of tourist markets as a means of supplementing their primary market and reducing vulnerability. Such an approach could supplement existing markets in developed destinations such as Guam and Saipan, or provide a focus for less developed areas such as Truk, which are now off the "beaten track." Guam and Saipan are already seeking to diversify a Japan-dominated industry by promotional efforts in other Asian markets such as Hong Kong and Korea.

Wace (1978) suggests that islands take advantage of their "remoteness and isolation" by marketing specialized tourism as a means of attracting "explorers" and "adventurers." Today, educational tourism is becoming popular as well-educated, upscale travelers seek opportunities to learn about the culture and environment of a given area. For example, Micronesia could feature its marine environment as a major attraction for snorkelers and divers in the U.S., Japan, Guam and Saipan. "Marine parks" could be established in selected areas to promote recreational uses in concert with conservation measures, as is being done at Fagatele National Marine Sanctuary in A. Samoa and at Managaha Island Marine Park off of Saipan in CNMI (Anon., 1984b). Visitor centers could help introduce first-time visitors to the natural environment and local culture.

In Hawaii, not-for-profit organizations such as Destination Hawaii, The Ocean Recreation Council of Hawaii, the Hawaii Council of Diving Clubs, and the Hawaii Fishing Coalition work to promote Hawaii as a recreational destination and also to promote the well-being of those renewable resources upon which their enjoyment and livelihood depend. Thus, the promotion of recreational activities could work towards the enhancement and protection of resources in the U.S. Pacific islands.

In addition, Hawaii has implemented two resource protection strategies which may be transferable to the U.S. Pacific islands: the marine life conservation district and the recreational fisheries management area. The former restricts various types of removal of marine life on a continuous basis and the latter permits fishing in a defined area every third and fourth year in a four year cycle. These management schemes provide subsistence fishing, as well as recreational and tourism, opportunities.

Tourism in Truk — a Case Example in Market Segmentation

> ...Truk could become one of the most popular resort areas in Micronesia because of its central location, the spectacular geography, the many sunken ships within the main lagoon, the cultural distinctiveness, and the long-range growth possibilities of the entire Truk islands (U.S. DOT/FAA, 1974).

Truk located in the Eastern Caroline islands, is one of the four states in the FSM. According to Truk's 1977-1982 Five-Year Indicative Plan, its gross domestic product was about $20 million, third in TTPI behind Saipan and the Marshalls (U.S. Dept. of the Interior, TTPI/Truk, 1977).

Truk is served by Air Micronesia, the regional trunk carrier, and Air Nauru which provides unscheduled service (PATA, 1982). Lack of direct air routes, especially connecting with Japan, has been largely responsible for the relatively few overseas travelers in Truk; other reasons are the modest accommodations and lack of activities and tourist amenities. As small as the tourism industry is in Truk, it is economically significant. In 1975, the $607,000 in estimated direct spending by visitors exceeded total commodities exports valued at $460,000 (PATA, 1977). Truk's tourism industry had about 100 employees, mostly in the hotels, only about 2% of the 5,900 jobs in the district (3,500 of which are in the public sector).

Tourism, ranked third in economic development priorities, is viewed as having a number of strengths, including: the sunken Japanese fleet, an attraction for divers; Truk Lagoon and its islands; friendly people; some air service; excess hotel capacity; and interesting history. There are also, however, a number of problem areas, including: poor roads and community appearance; lack of management expertise; little work motivation; and few visitor amenities (PATA, 1977). In addition, in the early 1980s there were two major cholera outbreaks which were linked to inadequate sewage facilities. Truk's 1977-1982 Five-Year Indicative Plan, however, clearly recommended against following the examples of Guam and Saipan (i.e., mass budget-oriented visitors; providing for large groups; creating night life with bright lights, gambling, and bar hostesses; and relying on duty-free shopping.

Education and extension.

If tourism development is to be directed by the "hosts" and not outsiders, then it will be necessary to educate residents about their own environment and culture. Through a better appreciation of their heritage, residents will be in a better position to evaluate what type of tourism is best for them. Awareness of and pride in their natural and cultural heritage are essential foundations for a locally-based industry. This is not to suggest that everyone will want to revert to a subsistence existence; rather, residents will be better prepared to interact with tourists on a one-to-one basis. This would be particularly important if the local industry is to be based on a "craft tourism" scale (Rodenburg, 1980). One approach which could be applied in a Pacific-island situation is "community interpretation," which focuses on getting residents to identify and present the "story of their community" to visitors (Cherem, 1984). This type of effort could build community pride plus point out positive aspects about a community. Community interpretation could be one aspect of a tourism development plan for a given destination.

Education will also be needed to persuade residents that they have an economic stake in the success of tourism and that tourism can provide jobs with good pay and status. Without local interest in tourism employment, the industry will be forced to use alien or nonresident labor. A feeling of ownership could do much to minimize potential negative socio-cultural impacts.

Extension services, such as those offered through Land Grant and Sea Grant Colleges in the U.S., could assist entrepreneurs, local government, and others in the long-term development of a tourist industry through leadership training, community development, public education programs, small business workshops, and other typical extension activities. Extension agents could also help identify research priorities and information needs and work with resource people in universities and government to obtain the necessary information. For example, through the Sea Grant network local agents would have access to publications, audio-visual materials, researchers, and other resources which might be helpful in developing tourism.

Other possible objectives for consideration and action.

(1) encourage the "host" islands to participate fully in joint tourism ventures, in addition to taxing and licensing activities;

(2) develop mechanisms to allow islanders to have more influence or control over air routes and carriers (i.e., enhance "open skies");

(3) mandate studies for the development of alternative and supplemental energy sources, and other means of self-sufficiency;

(4) provide incentives (e.g., free training, low rents or leases of public land or facilities, government promotion) for local entrepreneurs to develop on-land tranportation services, "home" crafts, and other ancillary tourism services;

(5) ask the U.S. Travel and Tourism Adminstration to contract studies for Pacific island tourism development and the feasibility of long-term regional tourism associations;

(6) request the U.S. National Park Service to conduct a "comprehensive inventory and study of the most unique and significant natural, historical, cultural, and recreational resources of Micronesia," as provided under Section 205 of Public Law 97-357, which could be invaluable in developing tourist attractions;

(7) devise mechanisms (e.g., exclusion from government promotional efforts, requirement for tax exemption, license to operate, etc.) which will get tourism businesses to participate in collecting tourism data;

(8) allocate money to local governments to contract long-term tourism development plans (e.g., "Tourism services manpower development study of the American Pacific islands" (UH/STIM, 1983); "Essential air service in the American Pacific islands" (PBDC, 1985));

(9) develop local tourism development plans and policies on tourism potential based upon the limits of acceptable change;

(10) maintain a regional tourism association which devises survey and data collection methodologies, collates and publishes standardized tourism statistics according to national/international guidelines (WTO, 1981a and 1981b).

OPPORTUNITIES AND CONSTRAINTS FOR U.S. PACIFIC ISLANDS TOURISM

Opportunities identified include:

(1) high islands have natural resources which can appeal to the tourist;

(2) development of infrastructure can benefit the local population if the development is not restricted to tourism enclaves;

(3) coastal zone programs in place for Guam, CNMI, and A. Samoa provide aid in terms of funding, planning, regulations and educational programs;

(4) tourism could provide the incentive for home products, cottage industries, agriculture and aquaculture;

(5) some islands with ocean-based tourism potential could establish marine parks and reserves;

(6) the long-term trend towards a cash economy and urbanization may ease the transition to increased levels of tourism.

Identified constraints include:

(1) lack of reliable, inexpensive, frequent air service.

(2) lack of adequate infrastructural development in most areas.

(3) lack of local investment capital

(4) reliance on imported energy, materials, food.

(5) attitude of the local populations towards tourism jobs and time schedules (Kiste, 1983; Kent, 1981).

(6) lack of trained personnel.

(7) reliance on one cultural market.

(8) increasing urbanization and diminished self-reliance.

(9) vulnerability to natural hazards, especially the area around Guam and Yap.

For small countries, it has been suggested that a "gradualist approach" to tourism development be taken (de Kadt, 1979a) and that tourism be considered as a "community industry", i.e., tourism development within a community framework and control (Murphy, 1982). The goals of the community-type industry are to provide a framework for raising the living standard of local people through the economic benefits of tourism; to develop an infrastructure and provide recreation facilities for both visitors and residents; and to ensure that the types of development within visitor centers and resorts are appropriate to the purposes of those areas. These thoughts essentially represent a "careful tourism policy" (Krippendorf, 1982) addressing environmental, social and economic issues.

Questions which tourism managers should ask themselves as they develop and manage tourism in their countries include:

(1) What type and how many tourists should be sought?

(2) How large should the tourism industry be?

(3) Where should tourism development be located?

(4) How concentrated or integrated should these developments be in the community?

(5) What are the local attitudes toward tourism and tourists?

(6) What resources must be committed?

(7) What resources are missing or inadequate?

(8) What are the "opportunity costs"?

(9) What products could be grown or produced locally for visitor consumption?

As government and tourism managers seek the answers to the above questions, they should keep in mind the distinctions between "hard" and "soft" tourism as outlined by Krippendorf (1982) in Table 4. "Hard" tourism obeys purely economic and technical forces, while "soft" tourism will emphasize the demand for an unspoiled environment and consideration of the needs of the people affected, i.e., the tourists and the local population. Each destination area will have to wrestle with the appropriate mix of "hard" and "soft", as well as the scale of development as defined by Rodenburg (1980). A single policy or program for all the U.S. Pacific islands would be meaningless as well as detrimental.

In summary, the LAC approach provides a process in which to plan and assess tourism development, and the distinction between "hard" and "soft" tourism allows managers to formulate and prioritize sets of goals and objectives for their locale. The more mature destinations, Guam and Saipan, will need to strengthen their land- and marine-use policies and begin to get the tourism industry involved in infrastructural improvements and tourism promotion and market research. The more remote islands will need technical assistance, manpower training, planning and infrastructural grants or loans. The main objective, however, should be community self-determination and self-sufficiency in order to promote assimilation of tourism into the community.

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APPENDIX A. Annotated list of tourism statistical sources.

Notes to Table 1

Page 1

1. American Samoa. Economic Development and Planning Office and Tourism Office. Statistical Bulletin 1983. 61p.

Statistics provided are by:

Purpose, broken down into months for the reporting year. A four year comparison is presented.

Purpose includes: Business, tourist, In transit resident, employment, visit relative

Total number of visitors by month/quarter for 5 years including reporting year.

Total number of visitors by quarter - percent change between years for five years.

COMMENT Does not provide definitions for categories (i.e., business, tourists, etc.).

SOURCES CITED:

Dept. of Legal Affairs - Immigration Division.

2. Asia Travel Trade 17(Dec 1985) p.19.

A summary table presenting inbound visitor arrivals in worldwide destinations:

Asia and Others (both broken down according to major destinations e.g., Austria, Canada, Burma, Japan, etc.).

Pacific: includes major island destinations, i.e., Australia N. Zealand, Fiji, Hawaii, etc., and Trust Territories of Guam and Marianas (broken down into Saipan, Rota and Tinian).

Statistics includes period for which statistics relate to; total arrivals; percent change; stay in days; and per diem expenditures. Additional notes are provided for specific data.

COMMENT Asia Travel Trade is pubished quarterly.

3. ASMAL Pacific Report. 1985. Vol. 10 No. 4 (March/April). 96p.

Of the Trust Territories, statistics are provided only for Guam. Type of statistics given are presented by Month according to country of origin.

Country origin includes: US/HI, Canada, Japan, Philippines, Taiwan, Hong Kong, Europe, Northern Marianas and Trust Territories.

No sources cited.

4. The Economist Intelligence Unit. 1982. Regional Report No. 12 The South Pacific Islands. International Tourism Quarterly. No. 1 1982.

Only statistics for American Samoa were provided and are classified according to year by:

Purpose (three year comparison)
Purpose: Business, Tourist, Transit, others (definition for transit and others is provided)

COMMENT Statistics given are very limited. Most of the information concerns brief summaries of the economic status, visitor arrival trends, prospects for the future with respect to tourism growth.

SOURCES CITED:
Planning Office.

5. Federated States of Micronesia National Government. Office of Planning and Statistics. 1982. National Yearbook of Statistics. No. 1. 88p.

Statistics were provided for the states of Yap, Truk, Ponape and Kosrae and are classified according to country ofrs Bureau. 1983. Visitor Arrival Statistics - July 1983.

Statistics provided are by:

Arrivals by geographical origins, broken down into year and months.
Geographical areas: Japan (further broken into districts such as Hokkaido, Chubu, Kanto, etc.) Other Markets (North America/HI, Northern Marianas, Trust Territories, Philippines, Europe, Taiwan, all other Areas and origin unknown).

6. Guam Visitors Bureau ~~rs Burea~~u. 1983. Visitor Arrival Statistics - July 1983.

Statistics provided are by:

Arrivals by geographical origins, broken down into year and months.
Geographical areas: Japan (further broken into districts such as Hokkaido, Chubu, Kanto, etc.) Other Markets (North America/HI, Northern Marianas, Trust Territories, Philippines, Europe, Taiwan, all other Areas and origin unknown).

Air, Sea and Air/Sea arrivals broken down by year (preceding and reporting year), month and geographical origin.

Purpose: Tourists, business, T. Residents (see comment below), relatives, school, convention and others. Japanese visitor statistics are further broken down by districts (see above) and a wider range of geographical origins for the Other markets are given.

COMMENT No explanatory notes or definitions provided

SOURCES CITED:
Visitor Statistics Questionnaire.

7. Marianas Visitors Bureau. 1982 Annual Report (Saipan, Rota Tinian)

Statistics provided are by:

Country of origin which is further broken down into months and quarters
Country of origin includes: Japan, U.S. and Others

Island of entry which includes Saipan, Rota, and Tinian.

Rate of variance between months (compares preceding and reporting year by country of origin and island of entry.

Seasonal distribution (percentage of totals) of tourist entries by months (7 year comparison)

Annual percent change of visitor arrivals by fiscal years

Direct Visitor arrivals (by month) from Narita airport to Saipan (2 year comparison)

Monthly visitor entry to Saipan, Rota and Tinian (separate data for each island by month and country of origin).

A breakdown of visitors to the Northern Marianas (as a group) by country of origin (Japan, U.S. (including Guam), Philippines, Rep.of China, Hong Kong, Germany, other European countries, Canada and other countries.

COMMENTS Emphasis is on Japanese visitors. No definitions provided.

8. Pacific Area Travel Association. 1985. Annual Statistical Report 1984. PATA, San Francisco 109p.

Statistics are given for PATA member areas only. Separate statistics for American Samoa, Guam and Micronesia are provided under the general heading South and Central Pacific.

General Statistics for American Samoa, Guam and Micronesia include:
- Total Arrivals, comparing 5 years
- Arrivals from US, Pacific areas, and Europe (additional breakdown is provided in a separate table)
- Arrivals from Pacific areas to member countries, including American Samoa, Guam and Micronesia.

Individual destination statistics are also provided:

	American Samoa	Guam	Micronesia
Arrival by Nationality & Mode of transport	x	x	x
Arrival by purpose of visit	x	x	NA
Arrival by Sex	NA	x	NA
Arrival by length of Stay	x	x	NA
Visitor expenditure	NA	x	NA
Visitor Expenditure breakdown by major items	NA	x	NA
Average Hotel Occupancy rate	x	x	x
Total No. of Hotel Rooms	x	x	NA
Estimated No. of hotel Rooms	x	NA	NA

Note: x = data provided
NA = data not available

9. Ponape State Statistics Office. Ponape Statistical Yearbook for 1981. 1982. 49p.

Statistics provided are by:
- Country of origin (combined data for Ponape and Kosrae).
- Year

A breakdown is given for number of hotel rooms, tourism earnings, restaurants and bars, car rental units and handicraft shops.

COMMENTS Explanatory notes are provided and relate to how visitors are counted; background information pertaining to pre-1978 statistics. (i.e., visitor counts for Kosrae and Ponape were combined); and other notes.

SOURCES CITED:
- Ponape State Tourism Office
- Federated States Immigration Office
- Quarterly Bulletin of Statistics, TTPI, Vol. 1 nos. 1 & 3; Vol. 3 No. 1.
- Annual Reports of Dept. of State to UN on TTPI.

10 ~~12.~~ Travel Journal International. 1985. Japan Travel Blue Book 1985. Travel Journal, Inc. Tokyo. 207p.

Presents statistics pertaining to Japanese tourists and visitors to Japan. Statistics relating to Japanese travelers were given for Guam and Saipan only.

Guam: Total number of Japanese visitors (and percent change) are given for three years.

Guam and Saipan: A brief summary of the percentage of total travelers to all destinatons were given for both Guam and Saipan. Data relating to sex ratios, purpose of travel, first time visit and average nights spent at each destination were also mentioned in the narrative summary.

11 ~~10.~~ Truk State Office of Planning and Statistics. Statistical Yearbook Truk State. FSM 1981. 72 Tables.

Statistics provided are by:

- Number of Tourists (7 year comparison)
- Purpose and country of origin (both broken down by month)
  - Purpose includes: Business and Pleasure
  - Country origin includes: Japan, U.S. FSM, other Pacific countries and Others.

COMMENTS No definitions or notes provided.

12. ~~11.~~ Yap State. Statistical Yearbook 1980 Yap State. 1981. U.N. Economic Advisor and Statistical Office (Yap). 80p.

Statistics provided are by:

- Total number of tourists per year (5 year comparison)
- Revenues by year

COMMENTS Presents a brief summary on general visitor trends, hotel capacity, occupancy rates and visitor to resident ratio. Also discusses the potential growth of tourism and proposes topics for further discussion.

13. U.S. Dept of State. 1984. Trust Territory of the Pacific Islands 37th Annual Report to the United Nations.

Annual report prepared by the Dept of State for the UN regarding the TTPI. Visitor statistics are given for the Marianas, Marshall and Palau island groups.

Types of statistics presented varied according to island group. Statistics pertaining to the Marianas Islands included total visitor arrivals for the preceding and reporting year broken down by months and classified according to geographical regions (Japan, US (including Guam) and Other Areas). Visitor statistics for the Marshall Islands were classified according to purpose (tourist, business, religious and other) and broken down by months. Palau visitor statistics included only non-Micronesian visitors and were classified by country of origin and purpose of entry; unlike the Marshalls and Marianas, no monthly breakdown of statistics was given.

COMMENTS Cursory definition was given only for the Palau statistical table. Data presented were totals for each island group; a breakdown by individual islands within each group were not given.

SOURCES CITED:
Marianas Visitors Bureau
Immigration Office (Marshall Islands)
Monthly Report of Entries (Palau Visitor Authority)

14. World Tourism Organization. 1985. World Travel and Tourism Statistics. 1983-1984. WTO Vol. 38 (1983-1984)

Statistics were available for American Samoa and Marianas only.

	American Samoa	Marianas
Movements: International visitor arrivals at frontiers from various countries	x	x
Movement: International visitor arrivals by mode of transportation air, sea etc.	x	x
Motivations: International visitors arrivals by purpose of visit	x	NA
Accommodations: capacity of hotels and similar establishments	x	x

Appendix B. OECD Research Framework and Guidelines

Table 4.2 A framework for the study of tourism and environmental stress (After OECD Research Programme Reports 1977; 1978.)

STRESSOR ACTIVITIES	STRESS	PRIMARY RESPONSE ENVIRONMENTAL	SECONDARY RESPONSE (REACTION) HUMAN
1. *Permanent environmental restructuring* (a) Major construction activity urban expansion transport network tourist facilities, marinas, ski-lifts, sea walls (b) Change in land use expansion of recreational lands	Restructuring of local environments expansion of built environments land taken out of primary production	Change in habitat Change in population of biological species Change in health and welfare of man Change in visual quality	*Individual* – impact on aesthetic values *Collective measures* expenditure on environmental improvements expenditure on management of conservation designation of wild life conservation and national parks controls on access to recreational lands
2. *Generation of waste residuals* urbanization transportation	Pollution loadings emissions effluent discharges solid waste disposal noise (traffic, aircraft)	Change in quality of environmental media air water soil Health of biological organisms Health of humans	*Individual defensive measures* Locals air conditioning recycling of waste materials protests and attitude change Tourists change of attitude towards the environment decline in tourist revenues *Collective defensive measures* expenditure of pollution abatement by tourist related industries clean-up of rivers, beaches
3. *Tourist activities* skiing walking hunting trail bike riding collecting	Trampling of vegetation and soils Destruction of species	Change in habitat Change in population of biological species	*Collective defensive measures* expenditure on management of conservation designation of wildlife conservation and national parks controls on access to recreational lands
4. *Effect on population dynamics* Population growth	Population density (seasonal)	Congestion Demand for natural resources land and water energy	*Individual* – Attitudes to overcrowding and the environment *Collective* Growth in support services, e.g. water supply, electricity

SOURCE: Pearce, D., Tourist Development, New York: Longman, Inc., 1981.

Appendix C. List of acronyms and tourism-related organizations

ASTA	American Society of Travel Agents
HVB	Hawaii Visitors Bureau
GVB	Guam Visitors Bureau
JATA	Japan Area Travel Association
JNTO	Japan National Tourist Organization
MVB	Marianas Visitors Bureau
MRTC	Micronesian Regional Tourism Council (inactive)
PATA	Pacific Area Travel Association
PBDC	Pacific Basin Development Council
PIDC	Pacific Islands Development Commission
PITDC	Pacific Islands Tourism Development Council
PISP	Pacific Islands Studies Program, UH
SPC	South Pacific Commission
SPEC	South Pacific Bureau for Economic Cooperation
SPREP	South Pacific Regional Environmental Programme
TTPI	Trust Territory of the Pacific Islands
USTTA	U.S. Travel and Tourism Administration
UH/STIM	University of Hawaii School of Travel Industry Management
WTO	World Tourism Organization

Background Paper No. 4

HANDICRAFTS INDUSTRY DEVELOPMENT AND RENEWABLE RESOURCE MANAGEMENT FOR U.S.-AFFILIATED PACIFIC ISLANDS

by

Margo Vitarelli

1986

Prepared for

U.S. Congress, Office of Technology Assessment,
Integrated Renewable Resource Management for U.S. Insular Areas,
Washington D.C.: U.S. Government Printing Office, 1987.

ABSTRACT

Fine craftsmanship and simple elegant design are the identifying features of the wide variety of fiber, shell and wood handicrafts made in the U.S. Pacific islands. The interest and demand for these unique items comes mainly from the expatriate and tourist populations within the islands. Very few types of handicraft are being produced for use by the indigenous island people.

The handicraft industry has the potential to contribute significantly to the social and economic well-being of island communities. Job opportunities, cultural awareness, preservation of traditional art forms, decentralization, and the provision of additional tourist attraction are some of the possible direct and indirect benefits resulting from a successful handicraft industry. However, in recent years, a gradual but consistent loss of skills has been evident, as well as low production, inadequate marketing and poor quality. Factors leading to these conditions include culture change in general, insufficient raw materials, competition of wage-earning jobs, a lack of markets, inadequate expertise and organization, and insufficient monetary return to producers.

Despite these negative trends, the industry can become a valuable asset to the economic and social life of island people. Cultural traditions and skills are not entirely lost, new ones are being created, manpower awaits direction, and markets can be stimulated. With thoughtful planning and good management, measures can be taken to redirect present trends. Consistent guidance and follow-through are needed to successfully implement policies, with special attention given to key areas such as marketing.

Conscious choices need to be made by island governments regarding the direction development will take, involving decisions concerning innovation, export, marketing and mass-production. Decision-makers will also need to keep in mind the inherent nature of an industry based on hand-made well-crafted items. Realizations must be made that while the handicraft industry most likely will not take the place of the copra industry, fisheries or government jobs in terms of economic impact, development of the industry deserves attention and organized effort, as it can make a substantial contribution to the total income of the people.

Furthermore, handicraft production can contribute immeasurably in other less tangible ways. With its capacity to enhance the creative, aesthetic and cultural aspects of community life, successful development can lead to a greater sense of identity and pride in indigenous skills and traditions.

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INTRODUCTION

The inhabitants of the U.S.-affiliated Pacific Islands, specifically, American Samoa, Guam, Northern Marianas, Marshalls, Palau and the Federated States of Micronesia, all produce varying kinds of crafts and art objects, both for their own use and for sale to outsiders. These handicrafts, as we shall call them, can be defined as articles made primarily with the power of the hands and simple tools, produced within the islands, utilizing predominantly local materials. The craftsperson may use traditional skills, often combined with introduced techniques and tools to create either items representative of the traditional culture, or creations that have become associated with a particular island group.

In the evolution of the traditional material culture, the cultural differences between island groups and the varying resources available caused striking variations to occur. The high islands, particularly Yap and Palau, are characterized by an art background stressing heavy and colorful decoration of large public buildings. Elaborate shell inlay work in covered bowls and money containers were characteristic of Palau, and pottery was made where clay was available in Palau, Yap and Saipan. Basketry and the hand weaving of natural fibers was the most widely spread skill, developed to a fine art in eastern Micronesia, where wood was scarce. Loom weaving was practiced in the central Carolines and tapa cloth was made in Samoa. Tools and household articles were fashioned from wood and articles of personal adornment were created from fiber, shell, wood and coconut. Ceremonial and symbolic objects included canoe prows, sculptural figures, bird and fish forms and a mask from the Mortlocks.

Contemporary craftspersons in the U.S. Pacific Islands still produce a number of kinds of handicrafts. Many of the objects are derived from or are related to objects once made for use within the culture. Others are totally new innovations and adaptations resulting from the use of new materials and tools or consumer demand. The majority of handicrafts produced today are, with some exceptions, no longer an integral part of the traditional culture.

Although the island groups of the U.S. Pacific islands are culturally and linguistically distinct from one another, they share a similar history of contact with the outside, causing them to react in like ways. The influence of outside dominant cultures and the material and technical opportunity presented caused new art forms to emerge. Seeking easier more practical ways to carry out their activities, they quickly replaced shell with steel, leaves with plastic and fiber with thread. Ceremonial houses and sculptures went into disuse through the acceptance of new lifestyles, religions and ideas.

Resulting from this process of change, adaptation and acculturation, we find that the majority of handicraft production in the U.S. Pacific islands today is stimulated by an external demand. No longer isolated, with a subsistence lifestyle, but in a state of transition, the arts of islanders are "rarely produced for their own consumption or according to their own unmodified tastes" (Graburn, 1976). The indigenous population of the U.S. Pacific islands usually prefers western imported goods and in the practicality of everyday life favors the use of imported tools, cloth, and containers over wood, fiber and shell objects of the past (Wenkam, 1971).

What exists today, then, are the 'arts of acculturation' which differ significantly from traditional expressions in form, content, function and medium. Because handicraft production has taken on new functions, largely economic ones, many changes have occurred. Today there is less range, diversity and variety of form as well as a decrease in the quantity and quality of production. Creating crafts for a tourist market causes miniturization, standardization and an increase in non-traditional forms.

But not all change is destructive or negative. New traditions are being created as people adapt to changing situations. Island people, of course, cannot exist in eternally stable conditions. Culture changes according to influences and people make choices to survive. In the present state of transition, handicraft production continues in the islands under different situations, with varying degrees of support and success. Although many are in a state of decline, not all traditional handicraft skills have been lost and many interesting and innovative forms have emerged. Rather than looking longingly to the past as a time of aesthetic 'superiority', it seems more appropriate to focus on the quality of the lives of islanders today in relation to the objects they create.

After World War II, the handicrafts of the Pacific were 'discovered' by the outside world to have aesthetic value. People from the industrialized world of the west viewed hand-made objects as attractive and of value. From western eyes, Pacific art objects were thought to give prestige and status to the owner and symbolize international travel and exploration. It is this desire to obtain these so-called exotic, rare and primitive objects symbolic of the Pacific which creates a demand for handicrafts.

There is much evidence to show that there is a demand for the handicraft products of the U.S. Pacific islands. Tourists, expatriates living in the islands, art collectors, and foreign museums and shops all express an interest in purchasing handicrafts. Although some items are still produced for local needs, it is predominantly this demand from the outside that encourages production. This foreign market supports the handicrafts industry of the Pacific and it is to the needs, wants and tastes of the outsider that most items are geared. Although it is evident that the effects of tourism on crafts are both positive and negative, it is also generally agreed upon that, "without tourism, there would be very few sales of handicrafts regardless of their origin or retail outlet" (Martin and Pryor, 1983).

A marketing survey was conducted in 1969 (Schultz, 1973) by a U.N. agency to determine whether there was an interest in Pacific handicrafts in the U.S. mainland, Hawaii and Canada. This was undertaken to discover if an export marketing venture would be profitable. Heads of selected outlets in major cities were interviewed and the results revealed a strong desire to carry Pacific handicrafts in their shops, as they felt they had "excellent sales appeal" (Schultz, 1973). The Report to the U.N. on the Trust Territory of the Pacific Islands (1977) includes a statement that "handicraft products are readily saleable both within and outside the territory, but production at reasonable prices needs to be stimulated."

Because of the complicated and sophisticated procedures involved in export, the majority of handicrafts are sold locally within the islands to visiting tourists. At the present, therefore, the success of the industry depends on tourism and not export. With a decrease in tourism, markets will disappear, causing a decrease in production. This close relationship between tourism and the handicraft industry must be recognized if steps are to be taken to improve the industry. Tourism influences almost all aspects of the handicrafts industry, from production to marketing, and is both the underlying stimulus for production and a potential cause of its demise.

Handicrafts are produced predominantly because they are a source of income, and yet there are additional benefits. Unemployment is lessened by providing an income to those who might otherwise have none. Money is brought into the country from outside and the standard of living for many is raised (Martin and Pryor, 1983). Natural resources are productively utilized. The participation of rural people in handicraft production helps prevent the drift of populations into towns, thus reducing the economic imbalance between rural and urban areas (Kanwal 1979). Capital investment is relatively low, little or no training is needed and few elaborate machines are used. There is flexibility, in that craftspersons are able to work at home, full or part time, acting as their own bosses, and can produce a varied line of products to suit themselves or the fluctuating market trends. This flexibility is especially important for women at home occupied with child care. Finally, the industry helps to perpetuate skills that without this impetus might otherwise be lost.

In addition to the tangible positive aspects of the handicraft industry, there are more subtle psychological advantages. Involvement in the industry often stimulates pride in one's own culture or instills a sense of national identity. In the effort to strive for political autonomy, island nations seek to restore their "self-respect, pride and dignity,"...and... "there is no better way to do this than to recognize our living and dead artists whose works symbolize our true selves" (Narokobi, 1975). A renewed interest in traditional culture and art often accompanies modernization and rapid culture change in the Pacific.

Thus the craft objects themselves become symbols and take on the function of maintaining ethnic identity and presenting to the outside world an ethnic image (Graburn, 1976). The interest in handicrafts calls attention to the cultural heritage and the importance of identification with this heritage. This, in turn, causes an island government or community to plan cultural sites or begin projects designed to present the local culture or art to outsiders. Thus, the culture and art is given added respect, local interest is revived and changing traditions are preserved. In addition to this, an outlet is provided for individuals who possess artistic skills or are inclined toward creative self-expression. In summary, the handicraft sector is one of the few areas which can strengthen traditional society and still play a special role which many can participate in and profit from.

Because a market for handicrafts does exist and because the indigenous population has much to gain from involvement in this endeavor, the development of handicrafts as a small industry has definite potential. Due to a number of interrelated problems and existing conditions, this potential has not yet been reached in the U.S. Pacific islands. From almost every island entity come reports that there is an insufficient quantity of locally produced handicrafts to satisfy the demand. It is often a problem of poor quality, inconsistent pricing, lack of raw materials, or haphazard marketing procedures. But a pervasive and underlying cause of low production even more influential is the availability of government jobs as a more profitable way to make a living. The lure of a steady income through an undemanding government job leaves craftsmen dissillusioned with the handicrafts industry.

At one end of the spectrum we have the producers, people equipped with the skills to create, and at the other end we have the consumers, with the desire and the means to purchase the objects. Problems lie in the gap between these two poles, specifically in the area of marketing. Understanding and finding solutions to the problems within this gap is one of the keys to the success of the handicraft industry. Developing the industry so that it will make a greater contribution to the economic development of these small islands warrants serious thought, careful planning and organized effort, as it will improve the living and working conditions of the people as well as encourage and perpetuate skills and artistic endeavor indigenous to the island groups (Schultz, 1973).

GENERAL EXISTING CONDITIONS

Although all the island entities suffer from problems which hinder their handicrafts industry from reaching its full potential, the situations on each island group are unique in certain ways. These sometimes slight differences, whether they be cultural, environmental, historical or economic, are important to review before generalizations can be made. *The following is a brief background* review of each major island group, touching on pertinent aspects of the existing conditions that relate to or have an effect on the handicraft industry.

Marshall Islands. In the easternmost part of Micronesia lie the many tiny atolls of the Republic of the Marshall Islands. They have a relatively high population of 30,000 with 12,000 living on the capital island of Majuro. The main local sources of revenue are copra production and income earned through the Kwajalein Missle Range (Marshall Islands Guidebook, 1984). Although the islands are flat and the scenic attractions and vegetation not as varied or appealing as that on the higher islands, Majuro is reasonably well equipped to serve the visiting tourist, with four hotels, numerous restaurants, night spots and a small airline that travels among the many atolls. However, it has been estimated that only 1,800 tourists visited the islands in 1984 (U.N. Annual Report, 1984).

A dedicated staff run an excellent local museum and four handicraft shops carry locally produced items. The Marshallese are known for excelling in the fiber arts, producing a wide array of intricately woven, plaited and wrapped baskets, purses, mats, fans and hats. In the limited atoll environment they have utilized to the fullest the resources available to them, namely the pandanus, coconut and shells. The islands' proximity to Hawaii and the military personnel of Kwajalein create a market for handicrafts, which are produced mainly by the women. There is an ample supply of weaving materials in the islands (Mason, pers. comm., 1986), and yet a marked tendency toward loss of skills and a decrease in quality seems to be the general trend.

Ponape. Politically, Ponape holds a special position as the capital of the Federated States of Micronesia (FSM), making it a center of activity and a meeting place. Geographically, being a high volcanic island, it has the potential to offer the visitor many attractions as well as offer the handicraft producer abundant resources. Culturally it is a mix of many different ethnic types. Outer islanders from Kapingamarangi, Nukuoru, Mokil, Pingelap and Kosrae have settled in Ponape and brought with them a rich heritage in handicraft skills. The artisans of Kapingamarangi are, in fact, the principal producers of handicrafts in Ponape, creating crafts which are a reflection of both a Polynesian and Micronesian art tradition.

There are four hotels on Ponape, two of which are well known for their attractive atmosphere and aesthetic use of local materials. Besides the good hotels and the natural beauty of the island, there are other tourist attractions which include the stone ruins of Nan Madol and the Nett Cultural Center. Four handicraft shops operate on the island, one being assisted by the government and another within the Kapingamarangi village of Porakiet. There is no museum or any agency specifically devoted to the promotion of the culture and the arts. Ponape does have a substantial number of talented and hardworking artisans and "circumstances have granted Ponape the potential for a flourishing handicraft industry based on both traditional indigenous and evolved contemporary handicrafts" (Martin and Pryor, 1983).

Truk. Politically part of the FSM, Truk has only two hotels on the main island of Moen, one local and one operated by Continental Airlines. Three main outlets for crafts exist, all small and not well stocked. The Government began a Small Industries Workshop, a production center producing mostly wood handicraft items. Production is sporadic and direction and support to this agency seem to be minimal.

Tourism in Truk is limited, attracting mainly divers who spend the majority of their time in the water and gain little exposure to the Trukese culture. There are few, if any, activities or attractions available to tourists on land, as there is no musuem, no cultural center, and no presentable theatre or night spot. The over population, poverty and general unkept look of the 'district center' of Moen make it unattractive to tourists, except as a diving spot. In spite of all this, Trukese artisans are skilled in both woodwork and fiber arts, the people are hospitable and pleasant and resources are plentiful. With the growing population's need for additional sources of income, a viable crafts industry would be a great asset to the local economy.

Palau. The Republic of Palau, an archipelego of high islands in the western corner of Micronesia, boasts a distinctive handicraft tradition in woodwork, exemplified by the popular storyboard. Two luxury hotels, smaller local hotels, the famed rock islands and some of the world's best diving spots make Palau an attractive spot for tourists, although the hotels are often only half full. Natural resources are fairly plentiful with the exception of local hardwoods. Although there has been a steady but slow decline in skills and the variety of crafts produced, a recent resurgence of interest in the culture and the arts has resulted in a number of beneficial programs. A lively and active museum exists, taking a strong interest in the support of local artists. Four gift shops operate in the islands, carrying basically the same items. An old-age center produces mostly woven items and a wood-workers guild continues in a kind of ad-hoc manner, with the majority of wood carvers producing on an individual basis. A relatively smal population of 14,000 and the lure of higher paying government jobs plus Palau's remote geographical location are among the hindrances to a lucrative handicraft industry.

Yap. Yap, and its outer islands, is a member of FSM and is situated just north of Palau. Known for holding on to their traditions, the people of Yap produce distinctive handicrafts still made for local use, as well as the tourist market. Tourism is a small fledgling industry, with only two local hotels to serve the visitor. The main handicraft shop is in the center of town, while two other smaller shops are in operation, none as well-stocked as they could be. There is one small, unchanging museum which has virtually no staff nor active programs to support local craftspersons. There is no art council or other government agency actively encouraging the production of indigenous handicrafts. A recent attempt on the part of the Yapese Student Organization at the University of Guam to import Yapese handicrafts into Guam has been quite successful in finding markets.

A large population of outer islanders, namely the people of Ulithi, Woleai and Fais, reside on Yap, bringing with them their unequaled and unique loom-weaving skills. With the use of a back-strap loom, they weave lava-lavas (wrap-around skirts) of natural banana fiber, hibiscus fiber, and/or imported cotton threads. Strong traditions put some limitations on the types of indigenous crafts that can be sold to outsiders, but there are still enough kind of handicrafts available to create a viable industry, if conditions are right.

Guam. Being a territory of the United States, Guam is subject to different circumstances than the rest of Micronesia. It has a population of 125,000, with 60% being American military personnel. A thriving tourist industry exists, as Guam leads the U.S. Pacific in tourism, and most of the visitors come from Japan. Available handicrafts are, for the most part, manufactured in the U.S., the Phillippines and Taiwan and marketed through Duty Free Shops, therefore, they are not much of a factor in Guam's economy (Martin and Pryor, 1983).

Very little is known of the indigenous arts of the Chamorros, due to the early date of European contact and the severe impact of it on their material culture. This, and the influence of the many different ethnic types living on the island today, make it difficult to discern what, in fact, can be considered indigenous art. This lack of knowledge hampers the development of an indigenous art movement. There are numerous outlets for the sale of handicrafts, a local museum, the Guam Insular Arts Council, the University of Guam, and a traditional model village project, as well as a large and continuous flow of tourist trade, and yet very few handicrafts are produced locally.

Northern Marianas. Saipan, Tinian and Rota share a similar culture history with Guam, although politically they form the Commonwealth of the Northern Marianas. Since 1977, when direct flights from Tokyo began, there has been a steady increase in tourism. In 1981, over 100,000 tourists visited the islands and over three-fourths were from Japan. Saipan leads Micronesia in tourism, second only to Guam. There are a total of nine hotels and five gift shops, carrying island style items, very few of which can be considered indigenous art. The majority of the items are from other parts of Micronesia, the Philippines, Indonesia and Taiwan. Duty Free Shops carry imported items which dominate the markets, and what remains of the indigenous arts are in a definite state of decline.

A Commonwealth Arts Council has some effect on the situation in their attempts to promote locally made handicrafts and an annual Saipan Arts Fest encourages local craftspersons as well. On Rota there is a model Chamorro Village and on Saipan a small government supported museum exists.

American Samoa. Being a U.S. Territory, American Samoa is dependent on the U.S., receiving approximately fifty-million from the U.S. per year. The island has about 16,000 visitors a year, which is less than Saipan, for example, but more than what the Micronesian entities receive. Unlike the Micronesian Islands, American Samoa is visited by about 14 cruise ships a year. Samoa is fairly accessible to the outside world with four flights a week from Honolulu and regular contact with the rest of the South Pacific. There is only one major hotel in Pago Pago, but there are six handicraft shops. Two organizations are active in promoting the art and culture, namely the American Samoa Arts Council, which funds the museum, and the Senior Citizens Handicraft Center. The arts council sponsors cultural programs, has over ten handicraft workers on their staff and sponsors an annual arts festival.

Although much of the culture is still intact and organized agencies exist to support the arts, nevertheless, productivity of handicrafts is relatively low. This has been attributed to the high level of income achieved in competing government jobs, the relatively small tourist market, and the dwindling supply of resources (Martin and Pryor, 1983). Also a large number of unemployed Western Samoans and Tongans, in need of a cash income, attempt to sell their handicraft products in American Samoa, underselling the locally made products (Sinavaina, pers. comm., 1985).

HISTORICAL BACKGROUND

The handicrafts industry has taken a variety of roles since the American administration of these islands. In the 1940's in Micronesia, the presence of American servicemen seeking momentoes of their stay in the islands encouraged the commercial production of crafts. The Marshallese produced by far the greatest amount of crafts in the occupied areas and the military controlled the operation, setting aside funds to purchase large quantities of crafts. Prices paid producers were set and standardized by the military government in 1944 (Richard, 1957), and were comparable to wages paid laborers. The inhabitants of many islands became self-supporting through handicrafts sales and a profit was made by the military government.

During the trusteeship period in Micronesia, handicraft production declined rapidly because of the loss of the most lucrative market, the military personnel. They were unable to find a satisfactory substitute market and export was made difficult by customs duties. The most important light industries during this early period of U.S. Administration were handicraft manufacture and boat building, but neither could provide a livelihood for large numbers of people.

The general trend from the 1950's until now has been one of fluctuating production with spurts of energy and revived interest occuring depending on tourism, the presence of strong and dedicated individuals (who set up co-ops, craft guilds, or fairs), the indigenous culture and a local need for cash income. A

Micronesian Production center on Guam assisted temporarily with export and the Micronesian Handicraft Shop in Kwajalein, through discriminate purchasing, brought about improvement in the quality of items offered.

Today, handicrafts are exported from the islands on a small scale and sold in shops, such as the Bishop Museum Gift Shop in Honolulu. Products manufactured in American Samoa are eligible for duty free entry into the United States. Articles imported from the Micronesian entities are also exempt from duty and according to the Compact of Free Association, will continue to be.

ROLES AND FUNCTIONS OF HANDICRAFTS

Local uses. The number of indigenous handicrafts produced for local use has greatly diminished over the years, as these decorative and utilitarian objects are being replaced by new introduced ones. The list of objects no longer made for local use is a long one, including such things as fish hooks, adzes, drills and other tools, wooden bowls, weapons, fiber clothing, jewelry and religious statuary, just to name a few. In the infrequent cases of traditional objects being made for local use, it is usually because no practical substitute has been found or the object carries symbolic religious or social significance. The coconut grater is an example of the former, and traditional money, is an example of the latter.

The number of crafts created for local use are far fewer than those made for sale to outsiders. In American Samoa, the fly wisk, part of the ceremonial garb of leaders is still used, as is the kava bowl and fine mats. These objects carry meaning in themselves and will continue to be produced as long as the aspects of the culture for which they were created remain intact. In both Yap and Palau certain forms of traditional money are still made which are used to demonstrate wealth and status, such as the tortoise shell money of Palau and the pearl shell money of Yap. The woven fiber and flower head and neck leis, commonly known as mwar-mwar, are worn on many of the islands. They serve as an example of a surviving tradition, and function not only in a decorative sense, but are used as gift items which symbolize a special relationship. The lava-lava, worn by the outer islanders of Yap, functions not only as clothing, but as a sign of belonging to a group, and being respectful of appropriate attire and in tune with the culture.

Certain utilitarian objects are made for local use because the substitutes simply do not do the job as well. The flexible, waterproof, disposable and free coconut basket is still used in most parts of the U.S. Pacific, as a purse, food container, betel nut basket, or travel bag. The tortoise shell comb, used to hold up long hair, is also a frequent sight in all the islands, as it is more durable and attractive than the plastic substitute.

There are also handicrafts of an evolved nature that are being made for local use that are distinctive of one particular area and yet are non-traditional in nature. These include the elaborate embroidered pillow cases of Truk, the attractive and innovative appliqué patchwork skirts made in the eastern Caroline Islands, and the hand-crafted trigger spear-guns of Palau.

Handicrafts for the tourist market. Irregardless of the negative effects the outside demand has on the quality and authenticity of handicraft items, it is evident that it is this external demand that encourages and stimulates production of the large majority of handicrafts in the U.S. Pacific Islands. Most crafts are made for sale to visitors and a decrease in tourism automatically results in a decrease in sales (Martin and Pryor, 1983). Without tourism there would be very few sales of handicrafts regardless of their origin or retail outlet.

Both utilitarian and non-utilitarian objects are made for sale to outsiders. Wood bowls, place mats, jewelry, purses and baskets are all popular items. Purely decorative items such as fans, storyboards, tapa cloth and figurines are also a common item on the market. Many of the handicrafts made for an external market are miniatures or models of objects once used in the traditional culture, such as model canoes, meeting houses, house post carvings (monkey men of Palau), or miniature pieces of stone money (Yap).

Handicrafts made for an external dominant world are often looked down upon by connoisseurs as unimportant and are sometimes called "tourist" or "airport art" (Graburn, 1976). These so-called "tourist arts" are, however important in presenting to the outside world an ethnic image, as well as providing a needed cash income for many people. In view of the need for economic development and an improved standard of living, the concern with whether or not an item is authentic or indigenous is secondary to its marketability.

MODES OF PRODUCTION

The Producers. Very few producers depend solely on the income from the sale of handicrafts for their livelihood. The majority of crafts produced are fiber arts, woven items and tapa, made predominantly by women. Many can fall back on a husband's income, and consider their own incomes supplementary. A small number of artisans are full-time producers. Among them are some of the more accomplished storyboard carvers of Palau and some of the Kapingamarangi carvers of Ponape. Other factors contributing to handicrafts being only a part-time endeavor are the fluctuating demand of tourist buyers, lack of marketing skills causing low sales, and demands on one's time from local customs.

In areas where fiber arts predominate, more women than men are involved in craft production. It is also often true that more outer-islanders (those living outside the 'district centers') produce handicrafts, than town dwellers. It has been estimated that only about 5 - 10% of the adult population of the Marshall Islands, for example, are close to full-time producers, but about 50% of outer-island women are involved in craft production on at least a part-time basis (Mason, pers. comm., 1986). Generally speaking, in areas where the fiber arts dominate, the producers are female, elderly and reside in the outer islands.

Handicrafts are normally produced on an individual basis, in the home, and in one's spare time. Production rarely occurs under any regulated, organized or group effort. Exceptions are museum-employed craftspersons of American Samoa, NEA-funded revival projects such as the storyboard carving apprenticeship program of Palau, the Small Industries Workshop of Truk, and the Old-Age Centers on many of the islands. NEA-funding for projects is possible if it is obtained through an agency within U.S. jurisdiction, such as University of Guam.

Government-Supported Efforts. Government-supported projects, have for the most part been few and far between. Although many have been well-conceived ideas and noble efforts, they suffer from lack of follow-up, poor direction, or inconsistency. Many are sporadic and temporary attempts, enjoying short successes but petering out eventually. On islands where there is a museum or arts council these agencies have been able to secure government funding to take an active role in the industry, but because of their varied responsibilities cannot concentrate on it alone. UNDP experts appear periodically to research, leaving behind relevant written recommendations that are difficult to follow without continued direction or funding (Vitarelli, pers. comm., 1985).

Production for Export. Most handicrafts are sold within the islands to visitors and are not exported. "Marketing goods for export is entirely different from competing in local tourist markets" (Schultz, 1973). Export goods must compete in quality and price on world markets. To export, an organized and efficient system involving storage, packing, bookkeeping and correspondence must be set up before the endeavor can be successful. Because of this, the sporadic efforts to export have been largely unsuccessful. There is often a delay in getting the money to the producers, too many middle-men cause price mark-ups making the items hard to sell, and international importers require consistency of quality, quantity and pricing, which are demands the local producers find hard to meet. As an importer in Hawaii commented, "Their crafts are just lovely but they are too highly priced and when we order them, they rarely answer our letters or send goods on time" (Warshauer, pers. comm., 1986). The steps that need to be taken to overcome the obstacles to a viable export marketing system have not yet been taken in the U.S. Pacific islands.

Mass Production. Although some crafts have the appearance of having been created in monotonous repetition, few items are actually 'mass-produced' in the islands. The Trukese love-sticks and the Mortlockese mask are repeats of one another and are by no means one-of-a-kind items, but they are still made on a small scale, by hand, by individuals. The only mass-production affecting the market within the islands takes place in the Philippines, where close-to-exact copies of Micronesian crafts are produced and sold in Guam and Saipan at a lower price than the authentic items. Copies have been made of Ponapean and Trukese woven wall decorations, Palauan storyboards and the Bo-Jo-Bo dolls of Saipan. The consistency of production in the Philippines satisfies the shop managers but the competitive prices have a drastic and detrimental effect on the locally produced items. The uninformed consumer, unable to recognize the difference, buys the cheaper item.

MARKETING ORGANIZATION

In the U.S. Pacific Islands, marketing one's product has been the responsibility of the individual craftsperson. The producers know which shops sell handicrafts and which tend to sell them the fastest. The museum gift shops are popular outlets, as well as hotel shops.

Marketing problems include fluctuation in production levels and pricing. Producers in Ponape, for example, attempt to change their prices frequently, while the mark-up remains a constant 25-30% (Martin and Pryor, 1983). This inconsistency causes confusion and misunderstanding, demonstrating a need for a fixed pricing system. In Truk, producers attempt to peddle their own handicrafts by hanging around hotel lobbies or at beaches (Rubinstein, pers. comm. 1986). By eliminating a middle man, they are sometimes able to make more profit, but tourists who bargain too aggressively and the time spent in peddling are drawbacks to this irregular method.

On some islands, handicraft items are not readily available in shops and tourists must seek out the craftsperson. Certain sought-after artisans in Palau, for example, can sell all they make, never sell in shops and their whereabouts are communicated by word-of-mouth. For the majority, however, it is important to have a centrally located accessible spot where crafts can be sold.

In general, marketing is a distinct function from production and one in which most producers are not well versed. Marketing includes advertising, pricing, display, and educating the consumer. Very few craftspersons are able to do this, and should not be required to, as it is more important for them to spend time on production. The hotel, museum and private gift shops take on the role of marketing the product which causes inconsistencies and competition. Cooperatives and intermediary marketing agencies are needed but no adequate ones exist. Marketing skills are crucial because the inability to find a market or be able to present a product attractively may make it less saleable, resulting in discouragement in the industry as a way of life.

TRANSFER OF SKILLS

The trend in the islands is one of a gradual loss of skills in traditional indigenous handicraft production resulting from the elderly having little opportunity to pass on skills to the youth. In the outer islands, the school age population simply is not there to learn the skills because they attend school in the district centers. In the district centers, the youth spend most of the day attending school, and when home, show little interest in handicraft production. Household chores, sports activities and television take up leisure time.

The loss of skills is not universal throughout the islands, however, and factors in particular locations allow for transfer of skills. The need for money is always an incentive to learning a skill, such as the woven wall decorations of Truk. Identification or affiliation with a group many result in a transfer of skills, such as the noted carvers of Palau, who have passed these skills on to their sons. When youth are not separated from the elders, when an object carries significance, or where the skill holds respect or status, the skills tend to be passed on.

Master-apprenticeship relationships allow for the passage of skills. At times, they occur when an organized and talented individual sets up the relationship, such as the well-known carver of Palau, Bernardino Rdulaol, who at one time ran his own shop where at least 10 apprentices worked under him. Government agencies, also, have attemtped to set up such relationships, such as the Kili Development Project of the 1950's, in which a Marshallese master-weaver was brought to Kili island to teach weaving with the intent of boosting the economy. The concept of the now famous 'Kili Bag' was developed at this time and became a best seller in the ensuing years (Mason, pers. comm., 1986). More recently, in Palau, a master-apprentice program was organized under the auspices of the Palau Museum with a grant from NEA to allow master carvers to pass on their knowledge to a group of unemployed but talented youth. Another NEA funded project operates in American Samoa, directed by their arts council, in which master carvers are given rotating employment on a yearly basis.

Numerous attempts have been made to teach traditional skills in the school systems. In American Samoa, for example, tapa artists visit schools and instruct students in this art form. Weaving and carving and cultural studies are inserted into the curriculum on many of the islands on an on-an-off basis, with varying degrees of enthusiasm, depending on administration policies and available funding. In most cases, courses involving traditional skills are considered secondary to academic subjects and are not taken very seriously.

Loss of skills has been caused by culture change in general, where objects once necessary for survival are no longer an integral useful part of the culture. If an object is small enough to be transported by the tourist, the skills to produce that item may survive. Items too large to carry in a suitcase, such as full-size canoes, house posts and meeting houses are, of course, the first to disappear.

The development of new skills and variations on old skills are cropping up on many islands. The carved ivory-nut jewelry of Ponape is a totally new art. Derivations of or evolved forms of traditional handicrafts are prevalent, such as the Ponapean fish mobiles, coral jewelry of Palau and stone sculpture of Truk. Non-traditional forms flourish in response to the demand from tourists. Often a tradition of fine craftsmanship will be transferred to a new non-traditional product, such as the currently popular patchwork and appliqued skirts of Truk and Ponape. Innovation should be encouraged as it is the result of new desires and needs and is often caused by artistic excitement and ethnic revitalization.

IMPACT OF HANDICRAFT PRODUCTION ON RENEWABLE RESOURCES

The resources utilized in the production of handicrafts fall into four basic categories: 1) fibers (from leaves, bark.husks), 2) nuts and seeds (ivory nut, coconut, bo-jo-bo nut and job's tears, for example), 3) shells, coral and turtle shell, and 4) wood. These resources have been subject to periodic, but not irreversible depletion at various times on different islands as a result of over-use, natural disaster such as typhoons and drought, and urbanization. Because handicraft production in the U.S. Pacific islands is still at a relatively low level the degree of depletion has not reached serious proportions. If, however, a systematic and concentrated effort to improve and expand the handicraft industry is made, methods of replenishing supplies of raw materials must be researched and implemented to avoid serious problems.

At the present, the production of handicrafts on some islands is hampered by periodic depletion of resources. The depletion is not due only to the lack of raw materials themselves, but by the delay in getting these materials to the craftsperson. A lack of raw materials is also caused by the delays in the preparation of these materials for use. This is true of the widely used pandanus fiber which must go through a lengthy preparation process of stripping, soaking, beating, drying and softening. This is most often done on the outer islands after which the prepared and rolled fiber is sent by boat to the district centers for use. Planning and foresight are needed if there is to be a constant supply of raw materials. Pandanus leaves in their natural state are plentiful, but the best quality leaves (pliable and durable) are grown on the hot, dry, sandy atolls. Because of this, they have to be imported into the high island areas from the outer atolls in island groups such as Truk, Palau, American Samoa and Ponape.

Certain types of hardwoods, such as the dort wood of Palau, or the ifil of Guam have become increasingly scarce because of overuse. No concerted effort has yet been made to replenish the supplies of these very popular hardwoods. Supplies of bo-jo-bo seeds, used to make the bo-jo-bo doll of Saipan, are seriously dwindling. They are obtained from a slow-growing vine, and because of their scarcity, carved seed-like shapes have been fashioned from wood to take their place. Coconut crabs, captured both for their delicious meat and for their decorative shells, sold mounted to tourists in the Marianas, are now on the endangered species list (Martin and Pryor, 1983). No effort has been made to raise them in captivity to replenish supplies.

Shells, used extensively in handicrafts made in American Samoa, the eastern Carolines and the Marshall Islands, have become increasingly scarce. In Guam, the development of shell handicrafts has been deemed unfeasible due to U.S. regulations concerning the protection of various species of marine life. Extraction of shells and live coral sufficient to satisfy the large tourist market on Guam would cause permanent damage to the marine ecosystem (Martin and Pryor, 1983). This situation exists on other islands as well, but many island governments either have no laws to protect shells and coral, or do not enforce the laws they have. The hawksbill turtle, an endangered species, is killed frequently in the islands, evidenced by the large number of well-crafted tortoise shell combs, earrings and bracelets on the market. The craft items are popular, sell well, and the turtles seemingly abundant, so that it is difficult for the craftsperson to see the logic behind the law. A project is underway at the Palau Mariculture Research Center which may increase the turtle population in time, but long term effects are as yet unknown.

On most islands there seems to be no appreciable negative impact on the supplies of fiber products used in handicraft production. Pandanus, coconut, banana and hibiscus fibers are all still plentiful and obtainable. Nuts and seeds, with the exception of the bo-jo-bo nut, are also available in adequate quantities. In fact, the hard shell of the coconut is underused and has great potential. On the other hand, supplies of wood, shell and coral are seriously being affected by not only the handicraft industry but by builders and divers, respectively. Due to the unavailability of adequate local supplies of wood, imported wood from Taiwan and the Philippines is sometimes purchased and used by island craftspersons. In Palau, for example, where there is a high demand for wood used in storyboard carving, imported Philippine mahogany is used when local wood supplies are low. (personal communication with Palauan carver, Maech, Ngiraibuuch, and Marino)

Further complicating the general issue of dwindling supplies are traditional land ownership rights which limit access to resources. Outer islanders who move into district centers usually cannot own land, are not allowed to collect materials from any area they please, and must ask permission or pay for supplies. The Kapingamarangi people now living on Ponape, for example, do not own land and their access to resources is restricted by these local laws regarding land rights. It is ironic that the Kapingamarangi people are the main crafts producers of Ponape, and everyone refers to their crafts as 'Ponapean', and yet their access to resources is severely limited.

In general the impact of the handicrafts industry on resources has been neutral or negative. The only beneficial effects are in the utilization of materials that otherwise might have been left unused. Although present supplies of raw materials are not in serious danger of depletion, it is a delicate balance that can be upset by an increase in production. Long term planning and an understanding of traditional land use is necessary if future supplies are to be ensured.

CONSTRAINTS AND OPPORTUNITIES

MAJOR CONSTRAINTS TO DEVELOPMENT. The persistence of handicraft production relies on a number of factors, among them: 1) availability of raw materials, 2) time to work, 3) knowledge of skills and aesthetics, 4) rewards and prestige, 5) continued demand for the items, and 6) proper marketing procedures (Graburn, 1976). In the absence of any of these factors there will be impediments to production.

Today, craftspersons are producing items of varying quality and quantity throughout the islands. If present conditions continue, production will remain on a small scale. Trends toward standardization , simplification of form and a loss of traditional skills will most likely continue and most likely become more pronounced. The major constraints to the development of a viable handicrafts industry must be examined and addressed in order to find solutions.

Each island group has its own unique problems but the differences between them are more of degree than of kind. That is, all the islands seem to be subject to similar forces and circumstances, but in varying degrees. Major constraints are outlined here and apply to all island groups, some of course more than others.

1. Competition from wage paying jobs. The government is the largest employer in the U.S. Pacific islands. Government jobs are attractive as they supply a steady income, give status and are usually undemanding. The handicraft producer is not guaranteed a steady income, and the time spent in acquiring and preparing materials and production often puts him below the minimum wage. U.S. Federal aid has had a major impact on the lowering of production of handicraft (Martin and Pryor, 1983). Emulating western ways, islanders now tend to look down on those who work with their hands.

2. Lack of markets, The main markets are tourists, local expatriates and visiting dignitaries. The tourist industry "is active on a very small scale, owing to the lack of infrastructure and reception facilities, and its geographic remoteness..." (U.N. Annual Report, 1979). Handicraft sales can only be as large as the number of tourists unless a system of export is devised, which has not yet occurred.

3. Limited production. In some areas, producers have difficulty finding markets and in other areas they have difficulty keeping up with the demand. There can be a number of causes, among them, handicraft production not being a profitable enough venture, loss of skills and lack of good marketing procedures.

Limited production is also caused by slow production which is especially true of the carefully made, one-of-a-kind indigenous traditional handicraft items. "The extent of modernization is always a problem in attempts to adapt carving to business. Purely traditional artifact carving is a slow specialized occupation..." (Bollard, 1979).

4. Lack of marketing skills. Even where markets exist, and handicrafts are well-made, the craftsperson may not always be able to sell them because of lack of knowledge of the attitudes and tastes of the buyer, proper packaging, labeling or explanations regarding the piece. Marketing requires different skills that a craftsperson may not be equipped with. Advertising skills, bookkeeping ability and an understanding of pricing are also often lacking. Because of the inabilitiy to market a good product and receive a cash reward for the effort, the craftsperson may become discouraged and give up producing.

5. Inability to meet marketing demands. Consistency in quality, quantity and pricing are required by shops overseas and desired by local shops. Local producers have difficulty meeting these demands due to the rural lifestyle and a 'Pacific' sense of time and scheduling. Duty Free shops in Guam have refused on occasion, to carry Micronesian handicrafts due to their inability to keep up with the demand consistently.

6. Lack of organized marketing cooperatives. "Producers should be encouraged to concentrate on production instead of losing their creative time in hawking around goods from place to place" (Kanwal, 1979). A central cooperative agency handling sales eliminates each individual having to take care of their own advertising, which is too expensive to handle individually. "Because the handicraft market is specialized and costly on an individual basis, it is desirable that people cooperate in creating an active marketing program aimed at increased sales within the islands and overseas" (Schultz, 1973). The lack of central

cooperatives has made it difficult and discouraging for the less agressive and worldly wise producer.

7. Poor quality. Poor quality items sometimes sell because the buyer is uninformed or not discriminating or there is little else to buy. If there is a market, there will be crafts of all levels of quality. The so-called airport art cannot be irradicated, but well-made items should at least be available so that the buyer has a choice. A decrease in quality is usually caused by excessive demand and indiscriminate buying. If production were for economic reasons alone, maintenance of quality would be unimportant. Excellent crafts skills form the backbone of an island cultural heritage and to allow them to disintigrate reflects on both attitudes and identity within the islands and the islands' reputation abroad (Tausie, 1980). Shoddy craftsmanship, a lack of authenticity, a lack of variety and oversized items may cause slow sales. Quality control and customer feedback and education are needed in this regard.

8. Loss of skills. As skills are lost through culture change, fewer types of crafts are made and fewer people are able to make them. Forgotten over time, potentially useful skills and marketable items are lost in history. The process of the passing on of skills and cultural ideas on aesthetics may be interrupted. Conscious effort at revival are needed if variety and authenticity are goals in production.

9. Loss of culture and identity. Skills can be lost without a loss of identity. A general loss in cultural identity or pride can have a detrimental effect on handicraft production. Lack of interest and meaning will effect production. Forms of attire that identify (lava-lava and mwar-mwar) one as belonging to a particular group may cease to be made. Many objects present to outsiders symbols of the culture, but if the culture is no longer intact the objects lose significance.

10. Existence of competing imported goods. An ill-informed buyer will buy almost anything irregardless of its origins. Imported handicrafts and copies of island handicrafts are often attractive to the tourist in terms of price, size and availability. Where Duty Free shops exist in the islands, the sales of local crafts suffer. Duty Free has increased in business since their establishment in 1980, while local businesses dealing in handicraft sales, has declined (Martin and Pryor, 1983). Local producers have not yet devised competitve strategies such as advertising, labeling and education to make visitors aware of the difference between the authentic indigenous products and the imported souvenirs.

11. Difficulty in obtaining raw materials. Lack of resources can be caused by poor transportation of the materials to the producers, restrictions to the availability due to land rights, weather conditions, and simple depletion. The purchase of raw materials requires cash, not always available. Dwindling supplies of wood are especially apparent, while fibers are available in relative abundance.

12. Insufficient community support. If the general attitude of the community is disinterest or inability to view craft production as a worthwhile occupation, the craftsperson may experience little enthusiasm, low morale, or lack of pride because of the low status assigned his work. If a community does nothing to organize crafts fairs, displays or workshops which recognize the talents of the artisans, they will feel little support from their peers.

13. Lack of facilities, tools, or capital investment. Certain individuals have the potential of becoming craftspersons with the right encouragement, chance to acquire the skills, and the tools and materials to begin. Many unemployed youth could become involved if given the initial direction and means to take the first step.

14. *Insufficient use of local handicrafts*. Local offices, restaurants, and hotels might make much more use of locally produced items. Vases, baskets, bowls and decorative items can be utilized to enhance the local flavor of these establishments, but more often one finds imported glass and plastic instead.

15. *Insufficient support from the government*. The community can provide needed moral support, while the government can give economic support. Government-run schools, museums, cultural centers and projects can contribute to a more healthy artistic environment and one supprotive of the handicrafts industry. The island governments have made sporadic token efforts to solve the problems besetting the industry, but have not yet initiated any well-researched long-term comprehensive programs. They have a great deal of influence and power in determining the direction craft development will take and have not yet exercised it.

SOLUTIONS AND OPPORTUNITIES. Each of the constraints described in the previous section are addressed here with corresponding (in number) suggestions for solutions.

1. *Increased monetary return to craftspersons*. An incentive to producers would be higher returns in terms of time spent. Middle-men can be avoided by establishing a cooperative marketing outlet allowing profits to go to the producer. Steps can be taken to reduce the amount of time spent on preparation of materials and production, hopefully without sacrificing quality. "Economic forces lead not only to changes in size, but also to simplification of form and decoration. The fewer steps involved, the more the artisan will be able to produce, and the lower the unit price" (Graburn, 1976).

2. *Creating markets*. Tourism must increase or export arrangements must be made. An increase in tourism relies on improved infrastructure and advertising. Guaranteed markets can be set up by government handicraft centers who, in turn are responsible for distribution and sales, as is done in Fiji (Martin and

Pryor, 1983). With increased demand come the dangers of mass-production, poor quality and copies being made outside the islands, and measures must be taken to control these.

3. Increasing production. Attracting individuals into handicraft production by making the venture more lucrative would bring about an increase in production. Making the industry attractive by taking measures to make it a more profitable venture can be done by proper marketing, and establishing training and other support systems mentioned elsewhere in this paper. In addition, limited mechanization and the simplification of steps in production may increase production, but caution must be taken to retain fine craftsmanship.

The establishment of annual fairs or festivals serves to increase production, create markets, and in general focus attention on handicrafts and their producers. Fairs bring the community together in a festive atmosphere to celebrate the work of local artists, musicians and performers. Handicraft displays, sales, demonstrations and competitions can all be encorporated into fair events.

4. Improving marketing skills. Either a central agency for marketing should be established, or training provided for individual producers and shop owners. Knowledge regarding record keeping, consumer tastes and advertising are needed.

5. Aid in meeting marketing demands. The handicraft industry is characterized by producers working irregular hours, in spare time depending on demands from traditional custom, agricultural chores, etc. Their need for money fluctuates and the conditions affecting production are not static. Standardization and consistency are hard to attain. Intermediary agencies can help in this regard through education, feedback, constant communication with producers and shops. The shops should be made aware of the conditions under which

craftspersons work, as well, and not always expect consistency. They should be flexible enough to allow for one-of-a-kind items on the market which are often superior in quality and demand high prices.

6. Organizing cooperating efforts. Craftspersons can continue working as individuals but cooperate for specific purposes such as advertising or participation in fairs. By working cooperatively, competition can be reduced, profits increased, pricing standardized where appropriate and transportation and storage shared.

7. Creating marketable products. There is a demand from outsiders for both original art pieces and simple inexpensive souvenir items. Both are marketable and both need to be produced to satisfy demand. Means to ensure quality include informing the buyer with displays, booklets and brochures, and setting standards through displays of the finest work. Educating shop owners to become discerning buyers is necessary. "The quality of workmanship can be progressively improved by the only effective way, ie., by buying more at higher prices from the better artists" (Kanwal, 1979). Marketing surveys done in the Pacific by Schultz (1973) have identified characteristics that make handicrafts sell well. Among these are 1) uniqueness, 2) identification with an area, 3) a hand-made look, 4) detail or high quality finish, 5) good packaging, 6) explanatory labels. Workshops can be held which disseminate this information to producers. Other ways to create marketable products are to revive old forms or to create new forms. Indigenous skills and design schemes can be utlized to create contemporary works of art. Change and innovation are healthy signs of the ability to adapt and keep art alive.

8. Improve or revive disappearing skills. Discriminate buying can improve skills (see #6) and master-apprentice programs can be implemented. Museums and collectors have a special interest in traditional and 'authentic' art objects.

There have been attempts to recreate an art form that has fallen into disuse to satisfy this market. In Papua New Guinea, the people of Gogodola had lost a carving tradition until an anthropologist encouraged an artistic revival with the use of old photos of their ancient artifacts. This resulted in a successful cottage industry (Beier, 1975).

9. Maintaining a sense of culture. Fairs, museum displays, special publications, recognition to noteworthy individuals, teaching classes, documenting cultural activity, clubs and awards and film-making all are means to perpetuate a sense of cultural identity. Preservation of traditional ways is important but the dynamic character of culture should be recognized. The importance of local initiative in decision making regarding cultural activities is imperative.

10. Helping indigenous crafts compete with imports. Local handicrafts often lose out in the competition with cheaper imports. Legislation should be enacted to halt or regulate the import of competing items, especially the copies made of indigenous forms. Tags can be used to authenticate local handicrafts and public awareness can be created. While reducing foreign imported items, aid and encouragement must simultaneously be given to local producers so that the demands for handicrafts can be met.

11. Take measures to replenish supplies of renewable resources. Information regarding the cultivation of resources must be gathered by both knowledgeable local people and expatriate experts. Varying cultural traditions regarding land use must be taken into consideration. Reforestration programs should be initiated to ensure a continuous supply of wood. Laws should be enacted and enforced regulating the removal of shells and coral from their marine habitat. Neutral land areas can be set aside for the cultivation of fibers, cooperatively cared for by the craftspersons themselves (Martin, pers. comm., 1985).

12. Increasing community support. The government can take the initiative

and demonstrate to the public that activities concerned with culture and the arts and handicraft production are worthwhile and deserve our attention. The initiation and support funding of certain activities (see #9) can encourage community awareness and participation. Decision-making and organization must be left to the community to avoid unnecessary dependency on the government.

13. *Providing facilities*. Aid in the provision of tools, materials and a work place enables individuals to get started in handicraft production.

14. *Increasing the use of locally made products*. Create a consciousness among local and government establishments regarding the use of locally made products. Meetings, announcements and flyers as well as publicity or other incentives can be used to encourage local establishments to use indigenous handicraft products. Educate them regarding the ability of locally made items to enhance the 'island-flavor' of their establishments, which in turn, satisfies the visiting tourists.

15. *Increasing support from governmental agencies*. Governments can use their authority to have a profound effect on the industry. They have a responsibility to protect cultural heritage and to raise the standard of living. Support of the industry coincides with economic development goals regarding decentralization, development of cottage industries, and equal distribution of economic benefits in both rural and urban areas. McBean (1976) noted that the "Philippines, Thailand and Taiwan enjoy very active government support of handicrafts.." and that "...cooperatives are encouraged, courses of instruction in improving methods of production are arranged and a government department undertakes the whole business of publicity and sales promotion." Within the Pacific Basin, Fiji and Papua New Guinea have governments that take active roles in the industry resulting in quite dramatic beneficial results. Governments need to exercise authority and implement programs but should avoid sapping

local initiative. Without community input and support a program will have no lasting success.

RECOMMENDATIONS

U.S. Federal government agencies, insular governments, private industries, international organizations, as well as non-governmental organizations and traditional groups can contribute to the development of the industry in the islands by:

1) Conducting research concerning marketing, production, cultural attitudes and renewable resources.

2) Preparing a national plan for handicraft development.

3) Setting up government offices to monitor and coordinate all phases of the industry and handicraft-related organizations.

4) Establishing museums and cultural centers on every major island group, recognizing their vital role in presenting the culture to the people, providing a valuable tourist attraction, supporting artisans and helping to revive lost skills.

5) Establishing a non-profit, government-sponsored handicraft co-operative for the purpose of promoting indigenous handicrafts and providing an outlet for them, incorporating policies such as quality control, fair pricing, etc.

6) Providing technical guidance and expertise where needed or requested in such areas as export marketing, new skills or tools, or advertising.

7) Arranging regular transportation services where necessary, providing a link between outlying areas and central town markets.

8) Setting up extension services, employing full-time craft organizers to act as agents of small producers. They will provide a link between rural producers and central town markets and government agencies. The craft organizers shall be responsible for identifying master craftspersons who might teach, and potential entrepreneurs who might benefit from practical training. Regular personal contact with producers will maintain confidence and fine quality.

9) Realizing the important role of schools in transmitting skills and adjusting the curriculum to include courses in cultural studies, entrepreneurship and handicraft techniques. Setting up vocational education programs which would provide the facilities, tools and a place to learn traditional skills related to modern skill needs.

10) Recognizing the role institutes of higher learning can play in research, establishing and preserving collections, arranging exhibitions, and educating students.

11) Providing funds for the publication of information on handicrafts such

as highly illustrated booklets, posters, etc., to inform the public.

12) Enacting legislation to protect resources by restricting their removal or by making recommendation to replenish supplies. Allocate neutral land areas for the purpose of cultivating raw materials, in coordination with agricultural and forestry departments.

13) Enacting legislation to halt or inhibit imports of copies of indigenous handicrafts. Require by law the use of tags to authenticate locally made products.

14) Setting up well-designed displays of handicrafts at major hotels, businesses, banks and libraries.

15) Providing funding for participation in Pacific-wide conferences relating to handicrafts or art or major cultural events, such as the South Pacific Festival of Arts that provide stimulation, information and inspriation to artisans.

16) Providing funding for the documentation or filming of craftspersons in action, thus preserving their skills for future generations and creating a film to educate visitors.

17) Setting specific dates for major cultural events which might include such events as demonstrations, displays, sales and contests. (fairs, celebrations, etc.)

18) Taking steps to allow for a steady, but not overwhelming influx of tourists by improving infrastructure and visitor facilities and entertainment activities.

19) When export becomes feasible, compiling a trade index or list of products, producers, retailers to be distributed to overseas shops.

20) Creating tax incentives for organizations and businesses who support local handicrafts, or culture and the arts.

21) Establishing fair business practices allowing smaller businesses to compete with larger companies (ie., do not allow tour bus drivers to collect commissions from shops, as they do in Guam and Saipan).

22) Providing funding and guidance in the establishment of master-apprentice programs to pass on disappearing skills possessed by the elders, not only to preserve the culture, but to increase the variety of traditional handicraft items on the market.

CONCLUSIONS

Certain conscious choices must be made which will determine the direction development will take. Planners must make decisions regarding limited production as opposed to mass production. They must make choices between emphasis on indigenous traditional handicrafts and innovative derived forms. They must decide whether it is feasible to produce for export or for local consumption. Different methods of implementation are required depending on the choices made.

Fully understanding the inherent character of the handicraft market is an important step in this decision-making process. Traditional methods of craft production can never produce a uniform product in large regular quantities. If the choice is made to build up production, they can 1) adopt quicker production methods, possibly including machine-based operations, 2) continue to base production on traditional methods which are inherently slow, or 3) increase the numbers of people involved in production. The first, if no monitoring is undertaken, can result in poor quality and the ultimate failure of the industry. The second can result in imports taking over the market to satisfy demand. The third requires making the industry more profitable to attract more producers.

A wise approach to development is one of cautious step-by-step expansion. It is imperative to build on what skills already exist and to focus on quality and organization before mass-production is considered. Expansion of output should be considered after basic organizational problems have been solved. Taking one step at a time, observing the results closely and helping when the need arises are recommended policies. Rather than make extreme hard and fast choices between authenticity and innovation, for example, or between limited or mass-production, a policy consciously making room for both might be a solution.

There is a market for both the unique, exquisitely made craft items as well as the more inexpensive 'mass-produced' items. Recognizing that they each require different kinds of skills, attention and organization, they can exist side-by-side fulfilling different functions. There is room for the reproduction of indigenous ethnic arts as well as the evolved and more contemporary creations. "Old and new types of handicrafts can be produced simultaneously. In Fiji, village craftsmen use local hardwoods to carve intricate traditional bowls.

At the same time there is a thriving factory industry in town turning out highly polished bowls using machine lathes...there is a thriving tourist market for both these products" (Bollard, 1979).

There needs to be a range of quality and type of craft on the market to suit the range of people purchasing the items. Collectors and discriminating buyers looking for that special or unique piece are willing to pay high prices for it. But there will always be the buyer who has only $15.00 and wants to get four gifts. Handicraft organizers and policy makers must not allow either type of handicraft to shut out the other and must recognize and understand the differences between these types, thus displaying, advertising, and pricing them accordingly.

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LIST OF APPENDICES

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Appendix B	Main types of Natural Resources Used in Handicraft Production in the U.S. Pacific Islands
* Appendix C	Photographs of Typical Handicraft Products Produced in the U.S. Pacific Islands (by island group)
Appendix D	List of organizations related to handicraft industry development.

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* Appendix C not included.
Photographs in Appendix C were taken by Margo Vitarelli, 1985, from the collections of Dr. and Mrs. Leonard Mason, Gordon and Akemi Daniels, Dr. and Mrs. William Vitarelli, and Ms. Lyn Martin.

(T) - Predominatly used by tourists
(L) - Predominatly used by local people

Appendix A

TYPICAL HANDICRAFT ITEMS MADE IN THE U.S. PACIFIC ISLANDS

Island group	Handicraft item	Resources Used	Gathered (G) Cultured (C) By-Product (B)	Both Tourist & Local use	Local Use Only	Tourist Use Only	Strictly Ornamental	Used in Everyday Life(local)	Cultural/ Religious Significance
Marshalls	Kili bag	young coconut (leaves), pandanus (leaves)	C C	X (T)					
Marshalls	sleeping mat	pandanus	C	X				X(on outer is.)	(in past)
Marshalls	circular table mats	pandanus, coconut leaf rib	C G			X			
Marshalls	circular sewing basket (w/ lid)	pandanus, coconut leaf rib	C G			X			
Marshalls	fans	coconut leaf pandanus hibiscus	C C C			X	X		
Marshalls	hats	coconut leaf pandanus	G C	X (T)					
Marshalls	cigarrette case	coconut leaf pandanus	C C	X (T)					
Marshalls	crocheted fiber flowers	coconut leaf pandanus bamboo	C C G			X	X		
Marshalls	shell head leis	coconut leaf pandanus shells (cat's eyes, cowries, snail)	C C G	X				X (special occasion)	X
Marshalls	navigational stick chart	bamboo, mangrove or coconut wood, twine, (coconut) shells	G G G C,B G			X	X		(in past only)
Marshalls	canoe models	breadfruit or coconut wood	G G			X	X		

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Island Group	Handicraft Item	Resources Used	Gathered (G) Cultured (C) By-Product (B)	Both Tourist & Local use	Local Use Only	Tourist Use Only	Strictly Ornamental	Used in Everyday Life (local)	Cultural/ Religious Significance
Ponape (Kapingamarangi)	carved fish/ sharks	local hardwoods, breadfruit wood	G G			X	X		
Ponape (Nukuoru)	'Tino'figures	local hardwoods breadfruit wood	G G			X	X		(in past)
Ponape	coconut grater	"	"	X				X	
Ponape	fishing tackle box	"	"		(in past)	X	X	(in past)	
Ponape (Nukuoru, Kapinga)	model canoe	wood coconut sennit twine pandanus sail	G C C			X	X		
Ponape	eel trap (actual size & scale model)	wood strips coconut twine	G C	X				X (more in past)	
Ponape (Kosrae)	dance paddles	wood hibiscus fiber paints	G C			X	X	(in past)	X(in past)
Ponape (Kapinga)	sleeping mats	pandanus	C	X				(more in past)	
Ponape (Kapinga)	taro or breadfruit pounding bowl	wood	G	X				X	
Ponape (Kapinga)	hat	coconut fiber	C	X (T)					
Ponape	shell headband	pandanus, shells	C G	X				X(spec. occ.)	X
Ponape (Kapinga)	shark hook	wood coconut twine shell	G C G			X	X	(in past)	
Ponape	belt	pandanus coconut leaf	C C			X		(in past)	(in past)

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TYPICAL HANDICRAFT ITEMS MADE IN THE U.S. PACIFIC

Island Group	Handicraft Item	Resources Used	Gathered(G) Cultured(C) By-Product(B)	Both Tourist & Local Use	Local Use Only	Tourist Use Only	Strictly Ornamental	Used in Everyday Life(local)	Cultural/ Religious Significanc
Truk	love stick	wood paint	G			X	X	(in past)	(in past)
Truk (Mortlock Is.)	'devil mask'	wood paint	G			X	X	(in past)	(in past)
Truk	decorative mats (hurricane wheel)	pandanus coconut leaf mid-rib shells	C G G			X	X		
Truk	baskets	pandanus coconut leaf mid-rib	C G			X			
Truk	fans	pandanus coconut hibiscus	C G C			X	X		
Truk	fresh flower *mwar-mwar*	fresh flowers, (*ilang-ilang*) pandanus	G C		X			X	X
Truk	carvings (monkey-man style)	wood	G			X	X		
Truk	stone sculpture	stone	G	X			X		
Truk	patchwork and appliqued skirts	fabric, thread			X			X	X
Truk	crocheted pillow cases	thread, fabric			X			X	X

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TYPICAL HANDICRAFT ITEMS MADE IN THE U.S. PACIFIC ISLANDS

Island Group	Handicraft Item	Resources Used	Gathered(G) Cultured(C) By-Product(B)	Both Tourist/ Local use	Local Use Only	Tourist Use Only	Strictly Ornamental	Used in Everyday Life	Cultural/ Religious Significance
Palau	storyboard	wood (mahogany, etc.) paint shoe polish	G	X(T)			X		(in past)
Palau	'human' carvings (monkey-men)	hardwoods	G			X	X		
Palau	wood bowls	wood	G			X		(in past)	(in past)
Palau	model 'bai'	wood	G			X	X		
Palau	'ilengel' container (model)	wood	G			X		(in past)	(in past)
Palau	money pot (inlaid)	wood mother-of-pearl shell	G G			X		(in past)	(in past)
Palau	combs	bamboo tortoise shell	G G,B	X				X	
Palau	purses	pandanus	C	X(T)				X	
Palau	utilitarian basket	coconut leaf	G,C		X			X	
Palau	spear gun	wood, imported items (rubber, metal)	G	X(L)	X			X	
Palau	women's money	tortoise shell	G,B		X			(special occas.)	X
Palau	jewelry	coral tortoise shell mother-of-pearl	G G,B G	 X X		X		 X	
Palau	pottery (no longer in operation-terminated in recent past)	clay	C	X				X	

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TYPICAL HANDICRAFT ITEMS MADE IN THE U.S. PACIFIC ISLANDS

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Yap	miniature stone money replicas	stone	G			X	X		(in authentic form)
Yap	shell money	pearl shell coconut sennit	G C,B	X					X
Yap	'monkey man' carvings	wood	G			X	X		
Yap (Ulithi, outer islands)	lava-lava (skirt)	banana fiber, hibiscus commercial, imported threads	C	X(L)				X	X
Yap	baby basket	pandanus, coconut leaf	C G	X				X	
Yap	betel nut basket	coconut "	G,C	X(L)				X	X
Yap	fiber lei	hibiscus bark	C	X					X
Yap	jewelry	sea urchin spines	G			X			
		spondylus shell	G		X			X	X
		copra shell and white conus shell	G		X				X
Yap	change purse	pandanus	C			X			
Yap	carved birds	wood, paint	G			X			X(in past)
Yap	'grass' skirt (fancy, colored variety)	hibiscus, coconut pandanus, leaves food coloring	G,C	X(L)					X
	'grass' skirt (everyday variety)	" (without coloring)	G,C		X			X	X
Yap	combs	bamboo	G			X			(in past)
Yap (puluwat)	model canoes	wood, coconut sennit pandanus sail	G,C			X	X		

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Guam	carved latte stone (miniatures)	wood	G			X	X		
Guam	Chamorro dolls	imported				X	X		
Guam	coffee mugs	clay (imported)				X			
Guam	ladles	wood, coconut shell	G			X			
Guam	coconut oil perfume	coconut oil	C			X			
Guam	pandanus fans	pandanus	C			X			
Guam	cigarrette cases	pandanus	C			X			
Saipan	bo-jo-bo doll	bo-jo-bo seed coconut sennit seeds coconut fiber	G C G C,B			X	X		
Saipan	mounted, laquered coconut crabs	crabs, wood laquer	G			X	X		
Saipan	astray in shape of latte stone	wood	G			X			
Saipan	wood carvings (carabao, madonna, figures)	wood	G			X			
Rota	pandanus bags	pandanus	C			X			

Appendix A

TYPICAL HANDICRAFT ITEMS MADE IN THE U.S. PACIFIC ISLANDS

Island group	Handicraft Item	Resources Used	Gathered (G) Cultured(C) By-Products (B)	Both Tourist/ Local use	Local Use only	Tourist Use only	Strictly Ornamental	Used in Everyday Life	Cultural/ Religious Significance
Samoa	tapa cloth (siapo)	bark of paper mulberry tree	G,C	X (diff. types for each)			X(T)	X(L)	X(L)
Samoa	model canoes	wood, sennit pandanus	G C,B C			X	X		
Samoa	fly whisk	sennit wood	C G	X				(by special individuals)	X
Samoa	ava bowls	wood	G	X				X (spec. occ)	X
Samoa	floor mats	pandanus	C	X				X	
Samoa	fine mats	"	C		X			X(spec.occ)	X
Samoa	place mats	"	C			X			
Samoa	shell necklaces	shell	G			X			
Samoa	baskets, purses	pandanus	C	X		X(certain vaieties)		X	
Samoa	fans	pandanus coconut	C G	X				X	
Samoa	food bowls	wood	G	X(T)				(in past)	

Appendix B

MAIN TYPES OF NATURAL RESOURCES USED IN CRAFT PRODUCTION IN U.S. PACIFIC

Name of raw material	Used on which islands	Type of material and part used	Used to make what crafts
Pandanus (tree) (pandanus odoratissimus)	all islands	fiber / wood leaves	mats, fans, purses, baskets, pillows, ha wall decorations, cigarrette cases, wo sail on model canoe,
Banana Fiber (tree) (musa textilis)	almost all	fiber / leaf sheaths	lava-lava skirts, cordage, wrapping us in other crafts
hibiscus (bush) (hibiscus tiliaceus)	all islands	fiber / wood inner bark	fiber leis, mwarmwa ropes, nets, 'grass' skirts
Paper mulberry (broussonetia papyrifera)	American Samoa	fiber / inner bark	tapa cloth
Coconut (tree) (cocos nucifera)	all islands	fiber / wood/ shell leaves /trunk / shell of the nut / husk	leaves: baskets, purses, mats trunk: spears, shell: ladels, jewel lime containers, be husk: twine
Bo-jo-bo (vine)	Saipan	nut	bo-jo-bo doll
Job's tears (grass) (coix lachryma jobi)	most islands	seed	jewelry, eyes to do
Climbing fern (Palauan name: Ngidech)	most islands, primarily W. Carolines	fiber stem	baskets
River reed (Ponapean name:Lirau)	Ponape	fiber stem	baskets
Mangrove (tree) (bruguiera gymnorhiza)	high islands (mainly)	wood	wood carvings, stat
Bamboo (bambusa)	majority	'wood'	fish traps, hair co stick chart
Breadfruit (tree) (artocarpus atilis)	low islands (mainly)	wood	carvings, canoe mod
Ivory nut palm (metroxylon amicarum)	Ponape	nut	carvings, jewelry
mahogany (tree)	high islands	wood	carvings

Appendix B

MAIN TYPES OF NATURAL RESOURCES USED IN CRAFT PRODUCTION IN U.S. PACIFIC
(continued)

Name of raw material	Used on which islands	Type of material and part used	Used to make what crafts
Iron Wood (tree) (eusideroxylon swager)	most high islands some low islands	wood (hardwood)	carvings
Dort (tree) (calophyllum)	Palau Islands	wood (heavy, hard-wood)	carvings
Ifil (tree) (intsia bijuga)	many islands, especially Guam	wood (hardwood)	carvings
Hibiscus (bush) (tiliaceus)	most islands	wood (light weight, durable)	carvings
Stone	Truk, and a few other islands	stone, porous, light weight	carvings, breadfruit pounders
Trochus Shell	Most islands especially Palau	shell	jewelry (exported f use as buttons)
Mother-of-pearl Shell	Most islands	shell	jewelry, in-lay in wood bowls, carvings
Tortoise shell	Most islands, especially Palau	back of turtle (shell)	jewelry, women's money plates, combs
Cowrie, snail, other shells	Most islands, especially E. Carolines, Marshalls and Am. Samoa	entire shell used in original form	jewelry, parts of decorative wall hangings, purses
Coral (red and black)	W. Carolines	larger pieces of coral/ cut	jewelry
*Dyes from Tumeric (yellow)	most islands	tumeric root used to color fibers	'grass' skirts, fiber head leis, etc
*Dyes from clay (red, yellow)	high islands	clay	to dye wood bowls, canoe models
*Dyes from soot (black)	most islands	charcoal soot	to dye carvings
*Oil used as base for traditional dyes (paranarium nut)	high islands	oil from inside of paranarium nut	to dye the surface o wood

*(Above mentioned dyes are used only rarely today, as they have been replaced by the use of imported commercial paints. For coloring fibers, carbon paper is used as as a dye, resulting in a purpleish tone.)

Appendix D

ORGANIZATIONS IN THE U.S. PACIFIC ISLANDS SUPPORTIVE OF AND RELATED TO HANDICRAFT INDUSTRY DEVELOPMENT

The following organizations have goals and functions which relate to and/or have an effect upon the handicraft industry in the islands. They are listed here to show which types of organizations exist on which island groups, and to facilitate communication with these agencies, if the need arises.

Museums

Bill Wuerch
Museum Curator
Guam Museum
Agana, Guam 96910

Saipan Museum
Chalan Kanoa
Saipan, CNMI 96950

Jean P. Haydon Museum
Fagotogo
American Samoa

Faustina Rehuher
Director
Palau Museum
P.O. Box 666
Koror, Palau 96940

Jerry Knight
Director
Alele Museum
P.O. Box 629
Majuro, Marshall Islands
96960

Yap Museum
Colonia, Yap
96943

Arts Councils

Linda Reyes, Director
Guam Council on Arts and the Humanities
P.O. Box 2950
Agana, Guam 96910

Matilda Lolotai, Director
American Samoa Arts Council
P.O. Box 1540
Pago Pago, American Samoa 96799

Bernie Lopez, Director
Consortium for Pacific Arts and Cultures (CPAC)
2141 C Atherton Road
Honolulu, HI 96822

Ana Teregeyo
Commonwealth Council for Arts and Culture
P.O. Box 553, CHRB
Saipan, CNMI 96950

Sister Mary Callista, Director
Guam Insular Arts Council
Government of Guam
Agana, Guam

Appendix D

Old-Age Programs

The Trust Territory Department on Aging administers programs for the elderly in the Republic of the Marshall Islands, the Republic of Palau, and the Federated States of Micronesia (Yap, Ponape, Truk, Kosrae). The program is funded by the U.S. Department of Human Services and the U.S. Department of Labor. The Old Age Programs include a Senior Citizens Handicraft Center on each of the island entities, some more active and organized than others.

In American Samoa, the Territorial Administration on Aging (TAOA) operates a Handicraft Program where senior citizens perform their activities in two traditional Samoan houses in front of the museum. Current director: Tali Maae.

Visitors Bureaus

American Samoa Office of Tourism
Pago Pago
American Samoa

Dorothy M.S. Perez
Research Specialist
Guam Visitors Bureau
Tamuning, Guam

Ponape Tourist Commission
Kolonia, Ponape 96941

Palau Tourist Commission
Koror, Palau 96940

Mr. Conrad Reyes
Marianas Visitors Bureau
Saipan, CNMI 96950

Yap Tourist Commission
Colonia, Yap 96943

Truk Tourist Commission
Moen, Truk 96942

Marshall Islands Tourist Commission
Majuro, Marshall Islands 96960

In addition, a newly formed Micronesian Regional Tourism Council exists.

Fairs and Festivals

South Pacific Festival of Arts, - a Pacific-wide festival, held every 5 years, choosing a different island location for each festival:

1st Festival - New Zealand	(1970)
2nd Festival - Fiji	(1975)
3rd Festival - Papua New Guinea	(1980)
4th Festival - Tahiti	(1985)

The festival presents and promotes all the arts, including handicrafts, dance, music, etc. The Micronesian islands participated for the first time in the 3rd festival in 1980 in Papua New Guinea, and received wide acclaim for their contributions.

Palau Annual Fair
Truk Annual Fair
Flame Tree Annual Festival (Saipan)
Flag Day Annual Arts Festival (Samoa)
U.N. Day Annual (Yap)
Old Age Crafts Fairs (annual event on some islands; sporadic event on others)

Other Agencies Relating to Handicrafts/Art/Culture

Truk Small Industries Center
Moen, Truk 96942

Nett Cultural Center
(run by Ponape Government)
Nett, Ponape 96941

Community College of Micronesia
Kolonia, Ponape 96941

Micronesian Occupation College
Koror, Palau 96940

The following government agencies exist on each of the island entities:

Department of Forestry
Department of Resources and Development
Historic Preservation Department

A new pan-Micronesian non-profit organization, entitled The Micronesian Endowment for Historic Preservation was formed in 1985 in connection with Washington D.C. based Micronesia Institute. They can be contacted through the Alele Museum of the Marshall Islands.

Background Paper No. 5

TRADITIONAL CRAFTS IN THE U.S.-AFFILIATED CARIBBEAN ISLANDS: An Addendum to 'Handicrafts Industry Development and Renewable Resource Management for U.S.-affiliated Pacific Islands

by

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Folk Arts Program
National Endowment for the Arts

1986

Prepared for

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Integrated Renewable Resource Management for U.S. Insular Areas,
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TRADITIONAL CRAFTS IN THE U.S. AFFILIATED CARIBBEAN ISLANDS

The U.S. affiliated islands in the Caribbean consist of Puerto Rico, with its two small satelite islands of Vieques and Culebra, and the U.S. Virgin Islands, comprised of, in descending order of size and population, St. Croix, St. Thomas, and St. John. Though the two island groups are near each other in proximity, they are quite disparate culturally. Puerto Rico was a colony of Spain from the early 16th century to the turn of the twentieth century, and its population is primarily Hispanic culturally, with some admixture of Taino Indian (the Arawak-speaking pre-Columbian inhabitants), African (via slave labor imported in the early centuries of colonization), and Afro-Caribbean (through migration from other Caribbean islands). Denmark ruled in St. Thomas from 1672 to 1917, at which time all three islands were acquired by the United States. St. Thomas was a principal center for slave trade in the Caribbean during colonial times and the Virgin Island population is predominantly Black, with a minority of inhabitants of European ancestry. Old and new intra-Caribbean migrations are also evidenced by smaller, ethnically different enclaves, such as Frenchtown in St. Thomas, a survival of colonial times, and the more recently arrived Puerto Ricans, in large part from the island of Vieques, on St. Croix, where they now comprise about one-half the population.

As in the Pacific, traditional crafts until recent decades played a vital role in the daily lives of most Puerto Ricans and Virgin Islanders. People were dependent on traditional craft skills for many of their everyday necessities. At the same time, dimensions of aesthetic expression were interwoven with utilitarian demands. Then, as the modern technology and factory-made goods of the United States were increasingly imported from the 1920's to the present, three general trends of change were observable: 1) Many home-grown handicraft skills were eclipsed or were forgotten through disuse, as foreign-made or factory-made items were imported. Skills at roof thatching, for example, were all but lost as corrugated tin and other ready-made materials were used to cover people's homes. Brooms, vine baskets, palm hats, hand-hewn wood furniture, fish traps, and other common necessities were increasingly of foreign origin; 2) Society became more commodity-oriented, and the expectations of the consumer and the dictates of the marketplace played an ever-increasing role in the production of handicrafts. Crafts that were not competitive as commodities fell into desuetude. Traditional crafts that could find a niche in the marketplace often suffered an aesthetic disjuncture, as the set of aesthetic criteria that determined quality and beauty shifted from those of the local, primarily rural and agricultural community members to those of the citydwelling consumers of urban San Juan and foreign lands. In some cases, the change in the process of crafts production from the craftsman devoting great attention to each individual piece to the craftsman having to maximize the number of pieces produced in order to meet the demand resulted in greater standardization, a "flattening" of artistic diversity, and miniaturization; 3) the burgeoning tourist industry, hand-in-hand with underemployment, created an economically appealing situation for those interested in producing and selling handicrafts for foreign tourists. Many (if not most) of these crafts items were made and marketed as souvenirs or "hand-made" crafts and did not draw upon local traditional craft skills or aesthetic ideals.

PUERTO RICO

The traditional handicrafts currently found in Puerto Rico clearly reflect the three major strains in the island's cultural history. Woven hemp hammocks were common to the local Taino Indians (as well as to other Arawak-speaking peoples as far away as Venuezuela) and are still fabricated locally, particularly in the area of San Sebastian. Taino style-pottery continues to be made, though any population group with a separate Taino identity ceased to exist before this century. Replicas of ancient iconographic Taino symbols, particularly the oblong *cemí*, are also popular among numerous potters and woodcarvers.

The *bomba* drums of Loiza Aldea and other Afro-Puerto Rican communities are clearly of African derivation. The painted coconut husk masks of Loiza Aldea and *maracas* (rattles) made in several regions of the island show great affinity to the masks and rattles of certain West African groups.

The 400 years of Spanish colonial rule left its mark on Puerto Rican crafts, most of which are uniquely Puerto Rican while drawing from Spanish prototypes. There are today many fine makers of *santos* (religious icons), for example. After a period of devaluation, as carved wooden figures of Christ, the Catholic saints and the *Tres Reyes Magos* (Three Kings) were unfavorably compared to the more recently introduced, mass-produced, plaster statuary, today there is somewhat of a reversal of this trend, as handmade wooden santos often fetch relatively high prices from connoisseurs and collectors of folk arts. Carved wooden roosters, local birds, and the *coquí* (a small local frog) are also well known among local crafts. The local musical instruments — the *cuatro*, *tiple*, *bordonúa* (guitar-types), and *güiro* (rasp) — have enjoyed a resurgence of vitality since the 1950's. Other prominent Puerto Rican craft forms are lace-making, jewelry made from local seeds, shells, and coconut shell, basketry, machetes, wodden furniture and caning, tinwork, pottery, and papier mache masks used in the Ponce *carnaval*. In the 1940's and 1950's, the western community of Cabo Rojo was well-known for the fine palm fiber "Panama" hats it produced for export and local consumption. As the international popularity of these hats declined, and as cheaper labor from underdeveloped countries such as Haiti began producing similar hats for lower prices, the Cabo Rojo industry went into a decline. Some consider it a national scandal that the *pava*, a woven palm fiber hat closely associated with *jíbaro* (Puerto Rican native country dweller), and thus with national identity, is imported largely from other countries while the island's fine hatmakers are left to languish.

Though Puerto Rico's crafts have clearly suffered a decline in this century, in many cases there has been a renewed vitality since the 1950's. Several factors have contributed to this: 1) Under the early leadership of Dr. Ricardo Alegría, the newly created Institute of Puerto Rican Culture in the 1950's began a policy of stimulating the practice of indigenous traditional arts through contests, local and island-wide crafts fairs, exhibits, and educational programs of many sorts. The dramatic positive effect the Institute had on traditional crafts during the ensuing decades is beyond doubt; 2) In more recent years, the Puerto Rican government's Administración de Fomento Económico created its Office of Crafts Development, under the directorship of crafts activist Walter Murray Chiesa. This office provides technical assistance and, as its budget allows, tools to traditional craftsmen, actively reaching out to large numbers of individual master and apprentice craftsworkers throughout the island. It also has instituted an annual recognition program of Master Craftsman of the Year and Young Craftsman of the year, bringing honor, recognition, and greater visibility to Puerto Rico's most outstanding craftsworkers; 3) Several crafts items have been consciously promoted as symbols of national identity — the omnipresent *coquí*, the *pava*, and the *cuatro* (ten-string guitar) in particular.

As yet, the availability of raw materials for traditional crafts production in Puerto Rico seems to be keeping pace with the demand. As limited rural lands continue to be developed, and as certain crafts grow in popularity, the future may bring a shortfall in some areas.

THE U.S. VIRGIN ISLANDS

The traditional crafts of the American Virgin Islands suffered a similar decline as did the crafts of Puerto Rico, but have not enjoyed a similar renewal of vitality. Few traditional craft items have been converted successfully to commodities for the tourist of local market. The island's freeport status may lure tourists away from local products in favor of the duty-free offerings of luxury items imported from abroad. Most of the locally produced crafts items available are contemporary creations -- paintings, macrame, sculptures of found objects such as driftwood, and so forth. Some craft traditions continue — fishnet making, ornamental ironwork, calabash containers, baskets made from the hoop vine (Trichostigma Octandrum), fish traps, the woven grass hats of Frenchtown, cabinetmaking, and thatch house making -- but they are to be found at the margins of daily life.

In the U.S. Virgin Islands, there has not been the governmental recognition of and support for traditional crafts that there has been in neighboring Puerto Rico. The Virgin Islands Council on the Arts and the multi-cultural education divisions of the local public schools have given some attention to local traditional culture, but to date there has been no exhaustive survey to inventory local crafts and assess the needs of local traditional craftsworkers, nor has there been any focussed governmental effort at conserving local handicrafts.

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Background Paper No. 6

IMPACTS OF U.S. MILITARY PRESENCE ON U.S.-AFFILIATED ISLANDS

by

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Condensed by Susan J. Wintsch

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INTRODUCTION

The Importance of U.S. affiliated Islands to U.S. National Security

Taken together, these islands[1] are of great importance to U.S. national security. In the Pacific there are over 2,000 islands for which the U.S. has comprehensive, exclusive defense rights and obligations, plus several U.S. territories (e.g., Guam and American Samoa). Individual islands in the Pacific and Caribbean vary in strategic importance, with Guam and Puerto Rico much more significant than most, such as American Samoa. The islands' current or potential contributions to U.S. national security depend on the nature of the threat and on whether the U.S. is involved in a general war situation, a limited, regional conflict, or a power contest over spheres of influence. The U.S. is committed to the defense of U.S. territory plus the former U.S. administered Trust Territory of the Pacific Islands, and to maintaining lines of communication with its Pacific allies and friends. (According to the Annual Report of the Secretary of Defense to Congress for FY '86, more than 30 percent of U.S. trade is conducted with the nations of East Asia, and five of our mutual security treaties link us with East Asian countries.)

Strategic Importance of the Pacific Islands

None of the Pacific islands in question currently is threatened by hostile foreign powers, nor do most play an important role in our current or projected Department of Defense programs. Only a few (i.e., Guam) have major U.S. bases. The U.S. Navy, however, has a keen interest in certain contingency base rights in several districts of Palau.

Strategic Importance of the Caribbean Islands

These islands are of special significance to the United States, primarily because of their close proximity and the importance of achieving a more stable and less threatening security situation in the Eastern Caribbean. Puerto Rico is of particular significance due to the presence of a major naval installation there and its location astride major routes of communication.

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[1] For purposes of this paper, "U.S.-affiliated islands" include the following: Puerto Rico and the U.S. Virgin Islands; Guam and the Commonwealth of the Northern Marianas, the Marshall Islands, Federated States of Micronesia and Republic of Palau (the former TTPI), Midway, Johnston and Wake Islands. Others have been excluded because of the absence of U.S. military presence or any major periodic activities.

DOD officials view the Caribbean area as "America's third border" and would, therefore, view with great alarm any further Soviet or Cuban expansion of influence in the area.

ENVIRONMENTAL QUALITY, LAND USE AND THE U.S. MILITARY PRESENCE IN THE U.S. AFFILIATED ISLANDS

U.S. Military Installations in U.S. Affiliated Islands

Since the end of World War II, there has been a marked reduction in the U.S. military presence in these islands, particularly in the Western Pacific and the Caribbean. No more than four or five of over 2,000 islands under U.S. control or the U.S. security umbrella are base to major U.S. military units or the scene of major military activities. These are Puerto Rico in the Caribbean, including the Island of Vieques, and the Northern Marshalls, mainly Kwajalein Atoll, Guam and Johnston Islands.

The Caribbean

Most of the major Air Force and Naval units operating in or available for operations in this area are based in Florida, Virginia, Panama or at Guantanamo on Cuba. U.S. Forces Caribbean, at Key West, is the major command for U.S. forces and activities in the Caribbean, and reports to the Commander-in-Chief ATLANTIC in Norfolk, Virginia.

USN hydrofoils conduct surveillance and sea patrols from Key West, which is also base for a small composite air group.

A U.S. Naval training and exercise base at Roosevelt Roads, Puerto Rico has permanent air and surface forces, including P-3 patrol aircraft, to support the bombing and gunnery range of Vieques. There are approximately 3,400 active duty USN personnel at Roosevelt Roads, and the facilities are said to provide the principal backup for the U.S. base at Guantanamo, Cuba. An agreement with the government of Puerto Rico for the use of this range was signed in 1984.

There is also a local national guard unit on Puerto Rico (the 93rd Infantry Brigade), presently on inactive status. This unit occupies several acres and some exercise areas on the island.

The old Strategic Air Command base at Ramey is no longer in use, but is presumably available should circumstances require its activation. [See Tab A for details regarding U.S. forces on Puerto Rico.]

There are no permanent military installations in the U.S. Virgin Islands, and only sporadic naval or air surveillance or training activities in nearby waters and airspace.

The Pacific

The island of Guam, an unincorporated territory, has several important military installations, occupying about a third of the island. [Tab B.] Military personnel and their families comprise nearly 20 percent of Guam's population.

The Strategic Air Command air base at Andersen Field has Military Airlift and weather surveillance units, 14 B-52s, and 4 KC135s. This is a major air transport hub between Hawaii and the Philippines and a base for satellite communications. The 3rd air division is based here.

The naval facilities in Guam consist of a ship repair facility, a communications site, a naval air station, ammunition and POL storage areas, a submarine tender (to be phased-out when the Trident submarines are deployed). The USN is implementing plans to construct a new ammunition wharf on Navy property in Apra Harbor, at a total cost of approximately $215 million. The U.S. Naval installation is under the command of the Commander Naval Forces Marianas-COMNAVMARIANAS, who reports to the Commander-in-Chief U.S. Naval Forces Pacific, headquartered at Pearl Harbor, Hawaii.

While Guam's local government concedes the critical importance of these bases to U.S. security interests, it contends that much of the land presently occupied by the military is redundant to its principal missions. (3) U.S. military authorities strongly disagree, citing the need to be prepared for several major contingencies, including the phasing down or replacement of key facilities in the Philippines. The Department of Defense [DOD] is currently re-assessing its land requirements of Guam. Preliminary indications are that the DOD will decide that all of the land now under military control should be retained because of the growing Soviet military presence in the region and the uncertain future of the major U.S. air and naval bases in the Philippines. The Guamanian delegate to the Congress, however, has introduced legislation that would require DOD to return all previously declared surplus land (about 5,000 acres) to Guam.

Johnston Island, southwest of Hawaii, is used for the storage or disposal of certain classified materials. These activities are carried out by contractor personnel, under the supervision of the Defense Nuclear Agency and the USAF. There are no indigenous peoples on this land, nor are there any tactical U.S. military units.

Midway continues to host a small number of military personnel to maintain a small air facility which supports the Pacific fleet. Wake Island is used only periodically.

The Trust Territory, the TTPI,[2] including the Commonwealth of the Northern Mariana Islands, does play an important role in U.S. military plans and activities. At present there are about 200 active duty military personnel in the TTPI, most at the big missile test range--the Kwajalein Missile Range [KMR] in Kwajalein Atoll (Northern Marshall Islands). The remainder are members of five Civic Action Teams operating in the Federated States of Micronesia and Palau (Belau). [See Tab C for details.]

The 3,500 acre KMR is the largest U.S. military test range in use. The main user is the USAF, which launches its missiles from California. The primary missions of the KMR are to give technical support to missile and space projects as directed by an Army headquarters in Huntsville, Alabama, now part of the new Strategic Defense Command; to furnish logistical support and services to range users and tenants; and to coordinate U.S. government activities in the TTPI.

New generations of intercontinental missiles and anti-ballistic missiles are being tested at KMR. Of the 2,000 people involved, only 33 are active duty military personnel. There are also 41 U.S. civil servants, plus dependents. Global Associates, with some 600 personnel at the KMR, is the prime contractor. Some 573 of those working for Global are Micronesians, mostly Marshallese.

Of these 573 workers, local hire, about 40 percent are classified as unskilled labor, 35 percent as semi-skilled and the remainder as "skilled" or managerial. Their jobs range from various construction tasks to kitchen help, drivers, plumbers, electricians, medical assistants, commodity clerks, foremen, etc. Global officials state that there is a program to upgrade local employees, i.e., replace more expensive foreign or U.S. hire with local hire, including women.

Most of the range is lagoon surrounded by about 10 islands, from Roi-Namur in the north to Kwajalein island at the south. The outlying islands are used primarily for instrumentation [Tab D], mainly radar, cameras, telemetry and related technical equipment.

The highly complex but well-established operation at KMR has a profound effect on local inhabitants and ecology. The concentration of Marshallese on the island of Ebeye is a direct result of the presence of the range.

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[2] The political status of these islands is in transition. The Federated States of Micronesia, the Marshall Islands and the Republic of Palau are now fully self-governing. The formal termination of the Trusteeship awaits appropriate action in or by the United Nations.

Approximately 8,000 Marshallese and other Micronesians inhabit the 66 acres on this island adjacent to Kwajalein where some 2,500 Americans occupy some 900 acres. Most of the latter are dependents, including some Marshallese. Ebeye represents the most extreme example of the impact of U.S. military forces or activities in the islands included in this paper.

Conditions on Ebeye are characterized by severe overcrowding, acute socioeconomic problems and substandard (by Western standards) housing, medical facilities, schools and related social amenities.

Most of the people on Ebeye have migrated there from other islands--the "outer islands" of the Northern Marshalls--primarily because of the lure of well-paying jobs at the KMR or because of the presence there of relatives who are employed at the Range. Most of these people are not permitted access to base facilities at the KMR, although these restrictions have been relaxed over the past several years.

Ebeye has also been the recipient of a number of U.S. programs and funds, mostly from the DOD and Interior. See attachment on U.S. assistance, amounting to some $9 million per year. Much of this money has gone into the construction of new infrastructure, such as a new causeway north of Ebeye to Gugeegue--which should ameliorate crowding on Ebeye--a new desalinization plant, new power plant and sewage treatment facility, a total package of over $14 million.

Under the Compact of Free Association, the Marshallese will receive at least $9 million annually for the continued presence of the KMR; this is over and above local taxes and services received from the presence of U.S. citizens at the KMR and beyond the amounts scheduled yearly for the Government of the Marshalls under Section Two of the Compact. A substantial part of the $9 million, however, will be retained by the landowners as "rent" for the facility.

The U.S. military, primarily Navy and Marine forces, is also active in the Northern Mariana Islands (NMI). Naval, Marine, Army and Air Force units, less than a brigade in strength, conduct periodic maneuvers on Tinian. Marine Engineer and other tactical units exercise there several times each year, for less than 30 days; this includes time for certain civic action projects in behalf of the local populace. By agreement with the government of the NMI, the DOD has non-exclusive use of some 18,000 acres--about two-thirds of the island. This is pursuant to Section 802 of the 1976 Covenant which granted the NMI commonwealth status.

According to Governor Pedro Tenorio of the NMI, based on discussions with the Commander, U.S. Naval Forces, Marianas, there have been an average of five military exercises each year, during the past several years, on Tinian. Some 600-800 sailors, marines, USAF and National Guard (Guam) personnel have participated in these exercises.

According to the Mayor of Tinian, the NMI Department of Public Works and the Office of the Governor, a number of civic action projects were performed by these units following their tactical exercises. Some of these included repair of the Headstart School building by Seabees, assistance in the installation of water lines to a new subdivision, renovation of the local Commerce and Immigration building, installation of power distribution to the Marpo farming area, etc. A more complete list is attached.

Farallon de Medinilla is a small volcanic island north of Saipan. It is used as a bombing and gunnery target by U.S. naval forces in the Pacific and by the USAF tactical air squadron on Guam. Such exercises are said to be sporadic and on no definite timetable.

There are currently four U.S. military Civic Action Teams in the FSM. Small units of 12 specialists plus an officer assist local governments in the construction of small public works on the islands of Kosrae, Truk, Ponape, and Yap. There is also a team in Palau.

Projected or Planned New Installations or Activities

All of the above mentioned bases and activities are scheduled to continue through the foreseeable future.

Military patrols in the Caribbean may intensify if DOD gets more deeply involved in anti-drug operations. Otherwise, there are no known or admitted plans for an expansion or radical change in current deployments or activities on or near Puerto Rico.

In the Western Pacific, three potentially significant changes should be noted.

The U.S. and Palau have concluded a draft accord which would convert certain well-defined areas in Palau into military bases or training areas.

This agreement is based upon Sections 321 and 322 of the Compact, Title III, which obligates the Government of Palau to make available several well-defined defense sites. These sites and conditions for their use are delineated in a separate agreement attached to the Compact, to be voted on by the people of Palau on February 24, 1986. If approved, the Compact with Palau will be submitted to the U.S. Congress for its final approval, as was the case for the FSM and the Marshalls.

The sites in question are of three types: (1) exclusive use areas, such as the logistical installations on Babelthaup required for the training area; (2) joint use areas, such as the airfield at Arai; and (3) non-exclusive use areas, to be used only intermittently by U.S. forces, e.g., most of the training area on Babelthaup.

These rights and associated real estate were the subject of several prlonged series of negotiations between U.S. officials and local leaders and landowners. The first detailed survey and discussions with interested local parties was conducted by a DOD team and OMSN in early 1973. There is no doubt that local landowners, as well as local Palaun officials, are fully aware of the dimensions and proposed use of the lands in question.

Moreover, the bilateral agreement covering this matter spells out in some detail the conditions and restrictions which the DOD must follow in the event it chooses to exercise any of these options. For example, the DOD is required to "avoid unreasonable harm to the environment, including water areas."

Some or all of these designated areas might never be developed or used by the U.S. military. The U.S. has merely reserved the right to develop or use such areas, increasing its options for various contingency plans. The decision to deploy forces to Palau or to undertake any major construction will presumably depend largely on the evolving situation in the Philippines, and/or the pace and level of Soviet military activities in the general area, and the appropriation process.

A second possible expansion would be the construction on Tinian of a major air base for dispersed operations, i.e., as a back-up to Andersen AFB on Guam. However, there are no indications of any serious moves by DOD to do this over the next several years.

A third possibility in the Western Pacific would be to extend the KMR, to allow testing of the MX missile, or to provide an alternative range. In preliminary surveys made during the late 1970s, the NMI was selected as a possible site for a mini-KMR, as were some other areas of Micronesia more distant from California than Kwajalein. As of this date, however, there is no evidence that the DOD plans to extend or supplant the KMR.

COMNAVMARIANAS also plans to construct an observation tower on Farallon de Medinilla to improve its efficacy as a gunnery range.

A more comprehensive explanation of future U.S. military activities in the TTPI is attached, Annex A.

Summary

All in all, less than 8 percent of the population of the Pacific islands under U.S. control west of Hawaii are military or contractors working for military (excluding dependents). But the military does occupy some 42,000 acres--over 36,000 on Guam alone--a healthy percentage of the islands' total land mass.[3] There are only 6,700 personnel plus dependents on Puerto Rico (less than .2 percent of the population). The military occupies fewer than 47,000 acres (less than 2 percent of the land) there.

Also, it should be noted that the U.S. has agreed to "continue to apply the environmental controls in effect on the day preceding the effective date of the Compact to those of its continuing activities . . . and shall apply the provisions of the NEPA, et seq to its activities under the Compact and its related agreements as if the Marshall Islands and the FSM were the U.S." (Art. VI, Section 161 of the Compact).

PROCEDURES ADHERED TO BY THE U.S. MILTARY TO CONSIDER ENVIRONMENTAL AND LOCAL LAND USE ISSUES IN THE OPERATION OF EXTANT MILITARY INSTALLATIONS AND CONDUCT OF ACTIVITIES

DOD Directives

All military departments, the unified and specified commands and their field installations, and tactical units are required to follow the dictates of DOD Directive 6050.1, dated July 30, 1979 [Tab F].

The directive, "Environmental Effects in the U.S. of DOD Actions", covers all U.S.-affiliated islands. It is based on the Environmental Policy Act of 1969, CEQ implementing regulations, and several pertinent Executive Orders, e.g. 11514 and 11991.

All three military departments have issued their own directives or instructions reflecting the contents of the DOD Directive.

DOD Directive 6050.1 calls upon all DOD elements to ensure as much as possible that they carry out their missions of providing for the national defense in a manner consistent with national environmental policies. It calls for practical means and measures to protect, restore, and enhance the quality of the environment; to avoid or minimize adverse environmental consequences; and to attain the objectives of:

"(1) achieving the widest range of beneficial uses of the environment without degradation, risk to health and safety, or other consequences that are undesirable and unintended;

"(2) preserving important historic, cultural, and natural aspects of our national heritage, and maintaining, where possible, an environment that supports diversity and variety of individual choice;

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[3] However, the proportion is only 3.6 percent of the land mass of the TTPI.

"(3) achieving a balance between resource use and development within the sustained carrying capacity of the ecosystem involved; and

"(4) enhancing the quality of renewable resources and working toward the maximum attainable recycling of depletable resources."

To these ends, the DOD Directive states that "the DOD shall:

a. Assess environmental consequences of proposed DOD actions that could affect the quality of the environment in the U.S. in accordance with enclosures 1 and 2;

b. Use a systematic, interdisciplinary approach that will ensure the integrated use of the natural and social sciences and environmental considerations in planning and decisionmaking where there may be an impact on man's environment;

c. Ensure that presently unmeasured environmental amenities are considered in the decisionmaking process;

d. Consider reasonable alternatives to recommended actions in any proposal that would involve unresolved conflicts concerning alternative uses of available resources;

e. Make available to states, counties, municipalities, institutions, and individuals advice and information useful in restoring, maintaining, and enhancing the quality of the environment; and

f. Utilize ecological information in planning and developing resource-oriented projects." [Reference to Directive]

Field or base commanders are instructed to assess the environmental consequences of any and all proposed programs and actions, to consider the environmental consequences of their decisions, and to comment on environmental impact statements for actions within their area of concern.

All DOD components are directed to involve environmental agencies, applicants, and the public, to the extent practicable, in preparing environmental assessments. If such assessments argue against the need for an environmental impact statement, "the DOD component shall prepare a finding of no significant impact in accordance with CEQ 1501.4(e) and make the finding of no significant impact available to the affected public." [Reference to Directive]

A related DOD directive (4700.1) covers natural resources-conservation and management [Tab G]. It prescribes DOD policies and establishes an integrated program for multiple use management of renewable natural resources on DOD lands, consistent with the military missions. It calls upon all commanders to consider seriously the values of natural resources in all plans and programs.

A third and more recent directive, DOD Directive 4710.1 (June 1984) covers archaeological and historic resources located in and on waters and lands under DOD control." [Tab H]. It calls for integrating the legal requirements regarding archaeological and historic preservation with the planning and management of DOD activities, and requires each DOD installation to maintain an historic preservation plan. This may be part of a more comprehensive planning document that scientifically evaluates the likelihood that significant archaeological and historic properties are present. All known archaeological and historic properties must be inventoried and evaluated.

Navy

The USN has issued a detailed instruction to its components, OPNAVINST 5090.1 (May 1983), entitled "Natural, Cultural and Historic Resources." Chapter 15 of this instruction provides a Navy-wide multiple use program for the management, protection and nondamaging recreational use of renewable natural resources, including forests and woodlands, fish and wildlife, soil, water, and grasslands compatible with military missions. The program encompasses soil and water conservation, land restoration, noxious weed and poisonous plants control, agricultural outleasing, and range management, and is based upon a number of public laws, e.g. PL 85-624, the Fish and Wildlife Coordination Act; PL 86-797, Fish and Wildlife Conservation on Military Reservations; PL 91-190, NEPA; and on DOD directives.

The Commander, Naval Facilities Engineering Command is responsible for overall program management. He commands six field divisions, including one in Guam and one at Norfolk. The Engineering Field Divisions, EFDs, administer the program in the U.S.-affiliated islands. They and their staffs (natural scientists, usually biologists, as well as soil erosion experts and agronomists) advise base commanders or review plans that might impact on local renewable resources. They may direct the preparation of Environmental Impact Statements, or EISes, or contract out studies necessary to ensure compliance with the OPNAV instruction cited above.

As a consequence of this instruction, there is a search for alternative siting of a classified system [Tab J].

The field commands, EFDs, do not attempt to elaborate or expand on the basic instructions from NAVFAC. However, they do focus on special resource problems, and recently a proposal from the Utah National Guard to hold maneuvers on Tinian was rejected because the Guard had failed to produce an acceptable preliminary EIS. The EFD there is now reviewing a study on flora and fauna on Tinian. The field work was done under contract to Hawaiian Agronomics Limited. A companion study covering Guam is scheduled for next year.

The staff experts contacted at the EFD in Hawaii admitted that they had not been consulted during the selection of the proposed defense installations at Palau, surveyed in the mid-1970s, but contend that they will be asked to review any final plans once the DOD decides to exercise any of its options there.

This command has also requested funds to rectify soil problems associated with the Fena reservoir on Guam, through improved terracing of adjacent lands, plans to deal with the depredations of local cattle, etc.

Experts at NAVFAC contend that the local birds have "adapted well" to bombing and shelling around the island of Farallon de Medinilla; presumably they have learned survival behaviors. (4)

NAVFAC hopes to strengthen the enforcement of the basic OPNAV instruction and to enlist the services of the U.S. Fish and Wildlife Service in the preparation of implementation plans for resource protection activities. I was assured that the Pacific EFDs will ensure that local base commanders have sufficient funds, largely from the USN "Agricultural Outleasing Program" to comply with all relevant OPNAV instructions. Each EFD must produce a firm schedule of work in support of NAVFAC's Natural Resource Program by October 1987.

Army

The Department of the Army's regulation AR 200-2, now under revision, purports to implement DOD Directive 6050.1 [Tab J2]. Army Regulation 420-74 (July 1977) [Tab K] covers Army policy, procedures and responsibilities for the conservation, management, and restoration of land and renewable natural resources consistent with military mission and national policies. It applies to all commanders, field oeprating agencies, installations and activities under the control of the Department of the Army [DA], but not to civil works of the Army Corps of Engineers. The Corps must, however, abide by all pertinent laws and regulations.

Chapter 2 of AR 420-74 deals with land management, calling on local commanders to actively cooperate with local, state and federal organizations to carry out national land use and conservation policies and for all management operations to be conducted in accordance with accepted scientific and professional practices. It requires each major command and installation with jurisdiction over substantial acreage to provide technically qualified personnel to oversee all natural resources management activities, including Forest Management, Fish and Wildlife Management, Coastal Zone Management, and Outdoor Recreation.

Mr. Frank Klapp, (Army action officer for the Caribbean area at the Army's regional headquarters in Atlanta [FORSCOM]) described how the above cited ARs are applied in Fort Buchanan, Puerto Rico, an Army reserve training center and the only Army installation in the U.S. Caribbean islands.

He said that before the Army purchased 4-5 acres of new training ground there, the local commander convened a site-selection committee. It gave precedence to the strictest of the local and federal laws and regulations relevant to natural resource protection.

FORSCOM is particularly concerned about preserving wetland forests, according to Klapp. Land management plans for the preservation of these and other natural resources must be reviewed every 5 years and become integral parts of a Master Plan for each post. Local committees at each post include citizen and county authority representatives.

KMR

The Pacific Division of the Corps of Engineers is responsible for all environmental assessments at KMR. The prime contractor on KMR, Global, is required to adhere strictly to all pertinent DOD and DA regulations, as well as federal laws and regulations. Existing local laws or regulations reflect U.S. law. The Environmental Hygiene Agency, based at Ft. Sam Houston, Texas, monitors all KMR wastewater and related activities. A team from Camp Zama, Japan periodically checks out the sewage treatment operation. The main ecological problems on or adjacent to the KMR facility involve water availability, quality and wastewater. The base commander is getting substantial help with these problems from the Corps of Engineers and from experts from the CONUS.

The base commander, KMR also continues to assist residents of nearby Ebeye island with water-related problems, under the terms of the Compact of Free Association.

USAF

The U.S. Air Force, USAF, has issued instructions virtually identical to those cited above for the Army and the Navy, but is more concerned with such problems as noise abatement and the protection of birds from aircraft in flight.

At Andersen AFB on Guam, the rare and flightless Rail bird has become a primary source of nourishment for the rat-snake, according to USAF officials in Washington. The command has reportedly done its best to protect the nesting areas of this bird in the bushes along the perimeter fence, but apparently with little success.

Air Staff officials in the Pentagon report they are willing to cooperate more closely with Government of Guam officials to protect wildlife and other renewable resources, but that GovGuam officials have not reciprocated. This may be because the Air Force refuses to permit locals transit across parts of the base to reach certain prime beach areas and/or because they do not want to give any credence to the claims of several local families claiming ownership to certain lands in the Anderson area.

PROCEDURES ADHERED TO BY THE U.S. MILITARY TO CONSIDER ENVIRONMENTAL AND LOCAL LAND USE IN CONSIDERATIONS OF FACILITY SITING, CHOICE OF TRAINING AREAS, ETC.

In general, the U.S. military is required to adhere to the same directives, regulations and instructions in selecting new sites or in initiating new activities as apply to current activities or extant installations. Thus, in acquiring additional acreage near Ft. Buchanan in Puerto Rico, the U.S. Forces Command [FORSCOM] was obliged to consult first with local governmental authorities regarding the availability and suitability of certain parcels of land. Environmental considerations were important in the selection process, according to Mr. Frank Klapp at FORSCOM.

In the Pacific, on Tinian, no tactical military exercises are supposed to be held until a mini-environmental impact assessment has been submitted to and approved by NAVFAC, its EFD at Pearl Harbor.

In short, any DOD plan to expand land use, initiate new and expanded activities, or acquire new sites is by fiat supposed to take full account of the requirements of the NEPA and all relevant DOD directives, including instructions issued by the technical staffs of each of the military departments.

Based on informal contacts with Washington representatives and local island officials on this question, it is clear that there are mixed views regarding the effects of the presence and activities of the U.S. military. For example, many welcome the economic benefits derived from the presence of military bases, such as the jobs provided to local residents and income from taxes, while others cite a number of negative effectives--the loss of valuable lands, negative cultural impacts (undermining of traditional values), attraction of undesirable elements, inflation, overcrowding of schools, degradation of water quality, restrictions on economic growth, etc.

An excellent summary of local reactions has been provided by Mr. James Branch, Administrator of the Guam EPA. Following are excerpts from his letter:

Although the U.S. military has control of approximately one-third of Guam, large areas remain in a relatively natural state, with significant areas in nearly pristine native forest. Even some areas that have been developed for military purposes contain large areas of natural habitat. In short, DOD ownership and control of these lands has provided de facto protection to the wildlife population on these lands, e.g., the Mariana fruit bat which is an endangered species.

However, there have been occasions when military activities, or proposed activities, have either threatened or caused adverse impacts on wildlife resources, e.g., the Guam Rail(bird) situation at Andersen AFB, deer control on the flight-line at Andersen, land clearing at the Naval Communications site and fill deposited in the Atantano swamp--the Naval ammunition dwarf.

In most cases, according to Branch, these conflicts could have been resolved through established environmental review and permit procedures. They resulted from the lack of understanding, awareness of procedures or sensitivity on the part of individual military officers, rather than the absence of relevant policies or directives from higher military authority.

The U.S. military's acquiescence to local environmental controls, particularly control over groundwater resources, has been very slow, according to Branch. But, as of December 1985, the Guam EPA is getting relatively good cooperation from the military in most areas of environmental concern. One notable exception is the military's refusal to support a trash disposal project--a waste-to-energy incinerator--proposed by GovGuam.

Branch concluded his commentary by stating that one basic institutional cause for these problems or conflicts is that in most cases military officers are assigned responsibilities for the protection of natural and cultural resources as a collateral duty, without sufficient time, staff or training to properly handle such responsibilities.

Turning to the Caribbean, I was unable to get any critical evaluations from local authorities. It should be noted, however, that the DOD has in the case of the training area and range at Vieques made a concerted effort to provide significant benefits.

Under a memorandum of understanding between the USN and the Government of Puerto Rico, the DOD has undertaken a number of measures to improve the welfare of the people of Vieques. These measures include the provision of medical equipment, supplies for local civilian hospitals, assisting in the construction of local public works and a concerted effort to attract American industries to locate on the island.

As a result of a request from the Mayor of Vieques, the DOD's Office of Economic Adjustment has persuaded several major DOD contractors to locate small enterprises on Vieques. This program has created some 366 new jobs, e.g., a military clothing factory and a defense electronics subcontracting unit. This program is now at mid-point, according to DOD officials. Its sponsors hope to create an additional 500-600 jobs with some $43 million in potential investments from U.S. defense contractors, such as General Electric.

Concurrently, the DOD is attempting to increase the level of defense contracting in Puerto Rico in order to bolster its troubled economy. So far this program seems to be paying off. The level of contracting has risen from $187 million in FY 83 to $417 million for the first 11 months of 1985.

Puerto Rico also derives other benefits from the presence of the Navy there. Local Naval forces have been extremely active in assisting local authorities during and after major storms or flooding, providing transport, medical assistance, earth-moving equipment, etc. The Naval forces also accomplish a number of civic action projects in areas adjacent to the base at Roosevelt Roads.

In summary, there is not enough evidence to make any definitive judgments regarding the net impact of the U.S. military presence in these areas. In the final analysis, one must conclude that most commanders will accord priority to the fulfillment of their primary military missions, even when by doing so the dictates of the various DOD directives regarding the protection of the environment might be compromised.

CURRENT EXTENT OF, CONSTRAINTS TO AND OPPORTUNITIES FOR THE USE OF THE U.S. MILITARY AS A MARKET FOR LOCAL FOOD PRODUCTS AND OTHER RENEWABLE RESOURCE RELATED PRODUCTS

DOD is reassessing its overseas procurement policy regarding local food products, and recently sent a team to Guam to evaluate prospects for greater reliance on local markets, particularly fresh foods.

According to the Navy Resale Services and Support Office, Staten Island, New York, the USN attempts to keep local procurement to a minimum, relying instead on the Defense Procurement Supply Center in Philadelphia, a guaranteed source of warranted products. There are also certain accounting advantages to this, such as instant credit and refunds for sub-standard products. Only if the DPSC does not carry a particular item or commodity, or fails to meet minimum standards, are local commanders encouraged to procure locally. (7)

The USAF relies on the Defense Subsistence Region in Alameda, California to supply its Pacific installations. It supplies almost all of the food needs of the commissary at Andersen AFB on Guam. The procurement office at Andersen requisitions items directly. Some perishables like lettuce are flown in.

The base commander is permitted to locally procure fresh indigenous produce like Mangoes, coconuts or reef fish, but there is no consistent or substantial reliance on local sources for fresh food items.

This is in part because local sources are not completely reliable. Guam's local weather is the main problem; typhoons can wipe out crops, including coconut and banana trees, in a matter of minutes. Frequent droughts are also a problem as are local pests such as snails. Moreover, the government and the tourist industry seem to offer greater rewards than farming or fishing, in the minds of many locals.

One can sympathize with local base procurement officers who are more concerned with reliability and quality control, not to mention fixed prices, than they are about improving local community relations or assisting the local economy. Their primary loyalty is to their military customers and their dependents.

The main fleets (e.g. the Seventh in western Pacific) are generally either on the high seas, visiting foreign ports, or in home ports where fleet purchases are usually made through the central supply system in Philadelphia or Alameda.

Without more cogent incentives for greater reliance on local markets, the status quo will be difficult to change. Factors that could bring about a radical shift toward local procurement include a general improvement in U.S. military relations with local governments and citizen groups, more competitive local prices, and more reliable local sources. None are likely to materialize to any substantial degree in the near term.

ROLE OF THE U.S. MILITARY IN MAINTAINING NATURAL AND RECREATIONAL AREAS AS PART OF THE "VISITOR" (TOURIST) INDUSTRY

Relatively little is known on this subject. Commodore Dale Hagen has indicated, however, that U.S. naval forces on Guam put much time and effort into "beautification" work in and near the Naval Air Station, Agana, as a part of the COMNAVMARIANAS civil action program. The U.S. naval command there also assists in the erection and maintenance of latte stone and conducts a "sister village" program with some local communities involving small public works projects and beautification. (9) In general, the U.S. Air Force is less involved in the island's local affairs, but does have a limited civic action program and attempts to keep adjacent beach areas safe and attractive.

The USN conducts civic action work on Tinian and, less frequently at the Memorial Park area of Tanapag harbor, Saipan, where DOD holds reversion rights in case of emergency.

In other parts of the Pacific, any work in this area of endeavor is generally accomplished by the four CAT teams in the FSM and the one in Palau.

Mr. Gary Martin at the Office of the Commonwealth of Puwerto Rico here in Washington says the Navy is not very active in off-base activities on this island. In marked contrast to our forces in the Pacific, the military tries to keep a low profile on this island. Maintenance of historic sites and recreational areas is done mainly by the National Park Service or the government of Puerto Rico. The Navy has reportedly done a superb job in maintaining the natural beauty of Vieques Island, but this part of Puerto Rico is not a major tourist attraction.

According to a USN source on Puerto Rico (Lt. Charles Franklin, Public Affairs Officer, U.S. Naval Forces Caribbean), Navy Seabees from Roosevelt Roads do engage in various civic action projects, mainly at the request of local village leaders. The Navy also distributes brochures from the Tourism Co. of P.R. to its personnel, and has transported cannon from the El Morro fortress to and from CONUS for needed repairs and restoration, at no cost. The naval command there is considering a request to transport spent rockets from the CONUS to the city park of Bayamon.

ROLE OF MILITARY CIVIC ACTION TEAMS (CATS) IN U.S.-AFFILIATED ISLAND ECONOMIC DEVELOPMENT

CAT teams began operating in Micronesia in 1969, at the request of the Secretary of the Interior, to assist in the construction of priority public works, mainly roads and schools.

These teams modeled themselves after the Navy Seabee teams active during World War II in the Pacific theater. [See Tabs L and M for a more detailed desscription of the CATs and their history.]

It would appear that CAT teams have been a tremendous success in Micronesia, both politically and economically. Most of the new Micronesian states have lobbied hard for their local continuation. Only the Marshallese have not.

The services, however, have at times resisted organizing and training more teams because of budgetary constraints; each team is costly to recruit, organize and field. [See the above referenced Tab M.]

The one-time cost of three teams deployed and three back-up teams in home-port training is roughly $4 million. Added to that is $5 million in annual recurring costs. The traditional service position has been that recipients of CAPs services or the USAID program should cover all deployment costs except pay, allowances and non-expendable items.

In the past, the TTPI government funded most of the deployment costs and provided most of the raw materials (such as crushed coral) required by the agreed-upon job. But with independence and the advent of the Compact, these arrangements will lapse.

Under the terms of the Compact of Free Association and its subsidiary agreements, DOD will make CATs services available to the FSM and Palau for such projects, and activities as may be identified by the local Micronesian states and mutually agreed upon by the two governments.

The U.S. has agreed to provide up to four CATs to the FSM upon request and with the following provisions:

(1) that there be an annually agreed work program, in accordance with the terms of the Compact, to assist in fulfilling the national developmental goals of the FSM; and

(2) that the U.S. government shall support all team costs and the FSM shall provide an annual amount of $250,000 for each deployed team; construction materials; suitable public or private land, as required, for CAT base camps; all necessary access and entry; clearances into public and private land and all permits for projects; transportation or reimbursement, as mutually agreed, for inter-island movement of personnel, supplies and equipment; and new base camp facilities coincident with team relocation,

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unless otherwise mutually agreed.

Team personnel will all be specialists, and include one officer (usually a graduate engineer or architect) and 12 enlisted men.

Given the enormous infrastructure requirements facing the new Micronesian governments, the CATs cannot make a significant difference in the pace or ultimate progress of economic development. Literally hundreds of islands are in need of new public works. The teams do, however, provide excellent training for local apprentices and are a strong symbol of continued U.S. interest in the welfare of the Micronesians.

Of the four CAT teams now in the FSM (one in each of the four states), two are U.S. Navy, one is Air Force, and one is Army. They are supported by a base unit on Guam. A Seabee team in Palau is completing a road project in Arai; a team on Yap does community action programs; and one on Truk works in the outer islands drilling wells.

While some might challenge this program from the standpoint of strict cost-benefit analysis, it has helped scores of island communities and I believe it safe to say that it has been an outstanding success in terms of such intangibles as improved U.S. military-Micronesian relations. If this were not the case, the Micronesians would probably not be pressing the U.S. government to continue the program on a cost-sharing basis.

It should also be noted that the United Nations Trusteeship Council report of 1984 regarding the TTPI, in its section dealing with the CATs, states that "the CATS have made a great contribution to the development of primarily rural areas of the Trust Territory. Their efforts at training local workers in construction skill, machinery maintenance and other related fields have been a long-term contribution to the development of human resources as well." (U.S. Department of State, 37th Annual Report on the TTPI, p. 216).

POTENTIAL MECHANISMS WHICH THE U.S. MILITARY SHOULD CONSIDER TO INCREASE THE ROLE OF THE MILITARY IN SUSTAINABLE, ENVIRONMENTALLY-SOUND ISLAND ECONOMIC DEVELOPMENT

The U.S. military could do more to promote sustainable, environmentally-sound economic development. However, several major considerations or constraints must be recognized before specific measures are suggested.

First, U.S. military forces, in general, are committed mainly to their primary military missions. In most cases there is little time and few redundant resources to devote to secondary or tertiary pursuits. The

Pentagon's program budgeting leaves little room for activity not specifically included in approved plans or programs.

Tactical units that are equipped and inclined to assist civil authorities in promoting environmentally-sound economic development programs (i.e. CATs and various construction or engineering units located in the islands) are few and cannot realistically be expected to increase current levels of effort without substantial reinforcement. DOD might be persuaded to press Congress for the authority and the means to provide this. In the Kennedy period, the U.S. Army did organize and field a number of special forces units--the so-called Green Berets--who also had a strong civic action type mission. This, however, caused some resentment and strains within the Army and succeeded to the extent it did only because of very strong and persistent pressures from the top civilian leadership in Washington (including the Pentagon).

The USAF and the Navy commanders on Guam could be directed to provide more assistance to local authorities or to give a higher priority to the improvement of on-base ecological systems.

In addition, more land could be turned over to a joint civil-military team of managers dedicated to promoting local economic development and/or to improving the natural resource base of the island. This would be mainly up to the Navy, given the location and extent of its land holdings on island.

In the TTPI, opportunities are somewhat more limited by the paucity of U.S. military forces in the area and by the terms of the draft Compact of Free Association. Moreover, the Army at the KMR on Kwajalein has already launched a major economic development program under the "Interim-Use Agreement" between DOD and the government of the Marshalls. The Army command at KMR has assisted in the establishment of a local wholesale food distribution system hoped to end local dependence on the KMR military supply system. However, other federal programs, such as the USDA supplemental and surplus food programs, have tended to undermine local self-sufficiency initiatives. It is easier to open a can of tuna than it is to fish beyond the reef.

Puerto Rico is a unique case. The political and local security situation there works against an expanded U.S. military role in any areas not strictly related to the primary missions of the Naval or Marine units at Roosevelt Roads. DOD and the USN are already devoting much time and effort to improving the ecology and economy of Vieques Island, and to persuading major DOD contractors like General Electric to establish small industries there. They have also gotten the Smithsonian Institution to do a major study of the mariculture potential of the island of Vieques. Some 400 new jobs have already been created by this program, according to Col. Mike Davies, USA, of the OSD Office of Economic Adjustment.

There are two main ways a more substantial military role might be promoted in this area. One is to get the DOD civilian "brass," the SECDEF and the Secretaries of the several military departments to give higher priority to this mission (with some radical shifting of budgetary priorities). The second is to get the military leaders (the JCS, etc.) to direct local base commanders to give higher priority to such efforts. The base commanders would be unlikely to, however, without being given more resources for such a purpose or unless a higher authority allowed diversion of the required assets from other missions or program objectives.

FOOTNOTES

[1] For purposes of this paper, "U.S.-affiliated islands" include the following: Puerto Rico and the U.S. Virgin Islands, Guam and the Commonwealth of the Northern Marianas, the TTPI, Midway, Johnston and Wake Islands. Others have been excluded because of the absence of U.S. military presence or major or periodic activities.

[2] This annex is entitled, "Agreement Regarding the Military Use and Operating Rights of the Government of the U.S. in Palau-Concluded Pursuant to Sectionds 321 and 322 of the Compact of Free Association."

[3] However, the proportion is only 3.6 percent of the land mass of the TTPI.

Attachment X

List of contacts and sources

The following individuals were either interviewed in person or contacted by telephone during the course of this study, July 25-Sept 9,1985.

Colonel Richard Ryan,USAF,Spec Assist for Analysis,Office of Under Secretary for Policy and Resources, OSD,DOD Tel: 695 3289

Mr Robert Kubal,Dep Dir office of Foreign Military Rights, OSD/ISA Pentagon, Tel: 6956385

Col Tom Magness, Director US Army Environmental Office,Dept of the Army, Pentagon Tel: 694 3434

Mr Gary Vest, DEp Assistant Secretary for Environment and Safety,Dept of the Air Force,Tel 6979297

Col Al Moore, East Asia Pacific Div, J-5,JCS,Pentagon Tel 695 3289

Commodore Dale Hagen,USN,Chief,Naval Intelligence Command,Suitland Md.recently returned from billet at COMNAVMARIANAS. Tel 763 3552

Mr Lou Shotten, Natural Resources Division,NAVFAC,Hoffman 2 Bldg Alexandria Va a naturalist. Tel 325 8526

Mr Mark Imlay,Natural Resources Div. NAVFAC,biologist, same address as Shotten

Col Mike Davies, USA, Office of Economic Adjustment, Cafritz Bld Arlington Va Tel 695 3492

Cmdr Chip Tucker,USN, Navy Judge Advocate General,JAG, expert on legal aspects of environmental laws and Navy regulations and instructions. Pentagon Tel 6979163

Mr Wade Hinkle, OSD, PA&E,Pentagon, Operations Research Analyst,expert on US force structures abroad Tel 695 7835

Mr Gurden Drake,OSD General Counsel,Pentagon,responsible for drafting DOD directives in the environmental area. Tel 697 6921

Mr Gary Martin, Washington Office of the Commonwealth of Puerto Rico. Tel 383 1300

Mr Jimmy Chang, Chief of Facilities,US Corps of Engineers,WESTCOM, FtShafter,Ha Tel (808) 438 1526

Dr Jim Maragos,Chief Enviornmental Division Pacific Ocean Division of Corps of Engineers,Ft Shafter,Ha Tel (808) 438 1500

Ms Arla Strasser, Real Estate Division,CINCLANT Hdqts Norfolk,Va re plans and operations at Roosevelt Roads,PR. (804) 444 9051

Mr Timothy Burr, Fish and Woldlife Specialist, NAVFAC,EFD, Pearl Harbor,Ha Tel (808) 471 3217

Mr Tom Egeland,soil conseration specialistNAVFAC,EFD,Pearl Harbor,Ha Tel (808) 4713217

Mr De Gaetano,Navy Commissary Branch Manager,Navy Resale Services and Support Office,Staten Island,NY Tel (718) 390 3712

Mr John Perry,Commissary Specialist, Kelly AFB,San Antonio,Texas, Tel (512) 9456414

Mr Bennie Wall, Environmental expert regading KMR,Huntsville,Ala.Strategic Defense Command via Pentagon's liaison office,Tel 746 0153

Mr Frank Solomon, office of Territorial and International Affairs,Dept of Interior, Tel 343 4707 re the role of the CATs in the TTPI

Ms Nancy Boone, Guam desk, same office as Solomon, Tel 343 6816

Albert V.

Colonel ~~Al~~ Short, USA, Office of Micronesian Staaus Negotiations,OMSN, re future U.S.military plans in the western Pacific and OMSN's EIS,draft. Tel 343 9143

Mr Frank Klapp, Environmental Specialist re Caribbean and CONUS,FORCECOM,Atlanta Ga. (404) 362 3303

Mr Froilan Tenorio, NMI representative in Washington, 2121 R St N.W. Wash D.C. Tel 328 3847

Mr Don Woodworth, assistant to Tenorio.

Mr Paul Miller,Office of the Guam delegate to the Congress,re civil-military relations on Guam.Tel 225 1188

Ms Bernice Carbalito, Gov Guam office in Washington Tel 624 5424

Lt Cmdr Douglas Elznic,Navy expert of CATs, Dept of the Navy Tel 325 9132

Ms Ramsey Environmental Policy Office,OSD,DOD Pentagon Tel 695 7820

Lt Charles Franklin,USN Public Affairs Officer,US Naval Forces Caribbean,Box 3037 FPo Miami,Zip 34051 Tel (809) 865 2000

Mr James Branch, chief-Administrator. Guam EPA Agana Guam

Attachment B

List of Footnotes

1/ Weinberger,Caspar " The Annual Report of the Secretary of Defense to the Congress of the U.S." FY '86

2/ Statement provided by Col Dick Ryan,USAF,Special Assistant for Analysis in the office of the Under Secretary for Policy and Resources,OSD,DOD

3/ Rodgers,R.F. " Guam's Search for Commonwealth Status",Micronesian Area Research Center, University of Guam, 1984, pp 20-25

4/ Statements by Mr Mark Imlay,biologist on the staff of the Natural Resources Division of NAVFAC,Dept of the Navy,DOD

5/ IBID

6/ Statment by Mr Frank Klapp,Hdqts US Army FORCECOM Atlanta,Ga.

7/ Statement of Mr De Gaetano,Navy Commissary Branch Manager,Navy Resale and Supply Office,Staten Island,NY

8/ Statement by Mr John Perry,Commissary Specialist,Kelly AFB,San Antonio,Texas

9/ Statement of Commodore Dale Hagen,USN,Chief Naval Intelligence Command

10/ Report of the Office of Economic Adjustment,DOD, " Economic Development in the Marshall Islands" Aug '84

Attachment C

List of Acronyms

DOD--- US Department of Defense (the Pentagon)

OSD--- Office,Secretary of Defense

KMR--- Kwajalein Missile Range,Marshall Islands,an Army Command

NAVFAC--- Naval Facilities Engineering Command,reports to the Chief,Naval Operations

EFD--- Engineering Field Division,field commands of NAVFAC

OPNAV --- USN staff offices under the Chief,Naval Operations

ARs --- Army regulations

SAC --- Strategic Air Command

COMNAVMARIANAS--- Navy Command in the Marianas,Guam and the NMI

NMI --- Northern Mariana Islands,to become a commonwealth after Trusteeship

FSM --- Federated States of Micronesia (Truk,Ponope,Kosrae,Yap)

SDC --- Strategic Defense Command,DOD, superseded the Army's anti-ballistic command

JCS --- the Joint Chiefs of Staff,DOD

USA FORCECOM--- US Army's main field commant,Atlanta,Ga (US Forces Command)

WESTCOM--- Western Command,US Army in Hawaii,Ft Shafter

Gov Guam --- Government of Guam

TTPI --- Trust Territory of the Pacific Islands (Micronesia)

CONUS --- Continental U.S.

CATs --- US military Civic Action Teams, (Seabees and US Army and Air Force/engineering units)

Add the following Acronyms:

POL	Political Advisor or petroleum,oil and lubricants
USN	the United States Navy
OPNAVINST	Chief of Naval Operations Instruction
NEPA	National Enviormental Policy Act of 1969
EIS	Enviromental Impact Statement
CEQ	US Council on Enviromental Quality
SECDEF	US Secretay of Defense
JCS	the Joint Chiefs of Staff, DOD
OMSN	Office of Micronesian Status Negotiations

List of pertinent laws and directives

National Enviromntal Policy Act of 1969, PL 91-190 the NEPA

the Envoroemntal Quality Improvement Act of 1970 (PL 91-224)

the Clean Air Act as amended (42 USC 7609)

the Fish and Wildlife Coordination Act, PL 85-624

the Fish and Wildlife Conservation on Military Reservations PL 86-797

Impact of Federal programs on localities PL 92-583

CEQ regulation 1501.4

DOD directives" : 4700.1; 4710.1; 6050.1

OPNAVINST 5090.1

Army Regulation AR 200-2 and 420-74

Background Paper No. 7

EFFECTS OF U.S. MACROECONOMIC POLICY ON PUERTO RICO AND U.S. TERRITORIES

by

Ben Posner

1986

Prepared for

U.S. Congress, Office of Technology Assessment,
Integrated Renewable Resource Management for U.S. Insular Areas,
Washington D.C.: U.S. Government Printing Office, 1987.

ABSTRACT

The study is concerned with the issue of general U.S. macroeconomic policies that have a different impact upon U.S. territories and Puerto Rico than upon states. The term "macroeconomic policy" encompasses federal laws, regulations, and administrative instructions and interpretations that affect the entities involved.

Overview reasons why general U.S. macroeconomic policies impact on Puerto Rico and the territories differently are: Geographical (Each entity is an island with all the problems related to insularity.) Size (The territories are small communities with very limited natural resources.) State of Development (American Samoa, the Virgin Islands, and Guam are far behind states in their development. They lack skilled work forces at all levels; adequate resources; and adequate capital.) Socio-Cultural (All the territories and Puerto Rico are parts of other cultural and economic groupings that affect their trade, immigration, social, and cultural patterns).

The study selects seven policy areas and gives examples of specific macroeconomic policies that have a different impact upon territories and Puerto Rico than upon states. Areas selected are: Environmental Policies; Labor and Employment Policies; Immigration Policies; Maritime Policies; Tax Policies (including Section 936 of the Internal Revenue Code); Customs Policies; and Financing Economic Development Policies.

Conclusions reached are that the implementation of a federal government policy to promote and encourage renewable resource development in the territories and Puerto Rico will require a careful review of relevant existing U.S. macroeconomic policies; that there are many examples of inconsistent and contradictory applications of such macroeconomic policies; that changes in existing and the adoption of new macroeconomic policies by Congress require greater awareness and knowledge of problems that presently exists; and that Puerto Rico and each of the territories have some unique problems that need to be treated separately.

Recommendations are that a current Department of Interior project analyzing the effects of existing laws on the territories should include Puerto Rico and should be expedited; that applications of macroeconomic policies to the islands need to be tailored to the different situations in each; and that major reviews of the economic development of a specific territory (such as may be appropriate for Guam) may call for establishment of a special commission to develop the necessary supporting information that would be required for Congressional action.

INTRODUCTION

This study is concerned with the issue of general United States policies that have a different impact upon U.S. territories and Puerto Rico than upon states.

The focus is primarily on economic consequences, and the term "macroeconomic policy" is used to encompass federal laws, regulations, and federal administrative instructions and interpretations that affect economies of the territories and Puerto Rico.

Information Sources: The study relies primarily on secondary sources. Among the more important: The Economic Study of Puerto Rico, made by the National Technical Information Service, U.S. Department of Commerce, in 1980; the Second Interim Report of the Northern Mariana Islands Commission on Federal Laws to the Congress of the United States, Welcoming America's Newest Commonwealth, dated August 1985; a number of studies made by the Department of Interior; statements and testimony presented by representatives of the territories to committees of the Congress; and the U.S. General Accounting Office study, Issues Affecting U.S. Territory and Insular Policy, dated February 1985. Information was also gathered from interviews with officials from the territories or in positions involving work with the territories.

Major Sections. The study consists of:

1. The overview arguments of why general U.S. macroeconomic policies frequently affect U.S. territories and Puerto Rico differently than states.

2. An identification of major areas of U.S. macroeconomic policy that result in different impacts on Puerto Rico and the territories than upon states.

For each such area, the study identifies the policy involved; the reasons why it presents a problem for the affected entities; and, where possible, the means by which Puerto Rico and the territories might mitigate adverse effects from U.S. macroeconomic policies at the local level; and also, where possible, the means by which the Congress and/or the Executive Branch might mitigate adverse impacts of these policies.

3. Conclusions and Recommendations.

OVERVIEW OF WHY GENERAL MACROECONOMIC POLICIES HAVE DIFFERENT IMPACTS UPON THE U.S. TERRITORIES AND PUERTO RICO THAN UPON STATES

Each of the territories--American Samoa, Guam, and the Virgin Islands--and the Commonwealth of the Northern Marianas (CNMI) and the Commonwealth of Puerto Rico are different in many respects. But they also share some common characteristics that distinguish them from states of the United States. At the risk of some over-simplification, and of glossing over differences among the four entities involved, these distinguishing characteristics can be grouped as follows:

1. Geographically, each of the entities is an island. While there are some parallels with Hawaii (and to a lesser extent with Alaska), insularity affects air and sea communications; opportunities for mutual assistance with adjacent communities; costs of establishing and maintaining energy plants and other infrastructural necessities; different aspects of pollution; different problems with respect to trade with neighboring communities and the United States; special considerations affecting the foreign policy and national defense of the United States; and some individually unique problems (such as in the Virgin Islands a lack of usual water sources).

2. Size. Guam, American Samoa, and the Virgin Islands are very small communities, with limited natural resources. The opportunities for diversification of economic activities are extremely limited, therefore, and a single U.S. macroeconomic policy may turn out to have an inordinately major impact. Puerto Rico, a much larger entity, is affected to a more limited extent by its size.

3. Stage of Development. The economic development of the territories, CNMI, and Puerto Rico is considerably behind that of the United States, in terms of self-sufficiency, availability and use of resources (including human resources), and realistic planning. Puerto Rico, with its longer association with the United States, is ahead of the other entities.

To quote from a report on the economy of American Samoa, "Of the three basic inputs necessary for economic development--land, labor and capital--American Samoa has none."[1]

CNMI, the most recent territory with a population of less than 17,000, depends almost completely on tourism and aid from the United States for its survival. Its potential for economic development in other areas (commercial fishing and agriculture) is still being explored.

Other entities--Guam and the Virgin Islands--are somewhat further along than American Samoa and CNMI. But in the territories, at least, there is a shortage of skilled labor at all levels, including administrators. Further, there has been a "brain drain", because many young people on the islands with the resources to go to the United States and "make it" there lack incentives to return to their homelands.

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[1] U.S. Department of Interior, Office of Territorial Affairs. The Economy of American Samoa. Mimeographed report, 1979, p. 88.

Local and federally-sponsored programs to attract capital to the territories and Puerto Rico have helped to secure outside investments, but federal programs have not always been tailored to the economic needs of the territories, nor have they been coordinated with other federal policies, so that they have frequently not been very successful.

Development in the territories has also been hampered because necessary infrastructures (reliable energy; roads; waste disposal; fire and police protection; utilities; preparations for natural disasters such as hurricanes and earthquakes; and related needs) are frequently inadequate and almost always more expensive than in the United States.

Soci-Cultural Differences. The Virgin Islands in the Caribbean, and CNMI, Guam and American Samoa in the Western Pacific, are parts of broader areas that are economically and culturally different from the United States.

Puerto Rico differs culturally from the United States because of its Spanish heritage and language, and to some extent because of its Caribbean location.

These differences have a significant influence on how immigration, trade, and other general U.S. policies impact on the cultures and economies of the territories and Puerto Rico. Day-to-day relationships, communications, trade, competition, and the existence of family ties tend to perpetuate these differences and to delay the "melting pot" forces that operate within the United States.

Both Guam and American Samoa reported to the General Accounting Office representatives that certain general U.S. policies and programs disrupted the local culture.[2]

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[2] U.S. General Accounting Office. Issues Affecting U.S. Territory and Insular Policy. Report issued Feb. 7, 1985, p. 36.

EXAMPLES OF AREAS OF U.S. MACROECONOMIC POLICY THAT ILLUSTRATE DIFFERENTIAL EFFECTS ON STATES, PUERTO RICO AND TERRITORIES

ENVIRONMENTAL POLICIES

All the territories and Puerto Rico are covered by the National Environmental Policy Act of 1969 and subsequent environmental legislation.[3] All have problems with the policies set and applied by the federal government in this area.

American Samoa. In a March 7, 1985 statement before the Public Lands Subcommittee of the Congress, the Honorable Fufo I. F. Sunia testified on the proposed Compact of Free Association for Pacific entities. He mentioned five areas of the compact, one of which was environmental protection. He pointed out that under Section 161, the compact entities "shall develop standards and procedures to protect their environments." Although these were to be "substantively similar" to the various pieces of legislation enforced by the Environmental Protection Agency, the compact allows enough ambiguity to permit a less stringent application of environmental protection than in United States territories. American Samoa believes that environmental requirements are overly strict with respect to its tuna canning industry and the delegate from American Samoa makes use of this example to point out the inequity between the compact provision and the situation in American Samoa.[4]

Guam. Guam's problem with EPA policies has to do with the Clean Air Act. Specifically, it objects to the imposition of "seemingly unnecessary environmental standards developed for larger utilities located in centers of large populations."[5]

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[3] U.S. Department of Commerce. Economic Study of Puerto Rico. 2 Vols. Available from National Technical Information Service, 1980, p. 221.

[4] Suna, Honorable Fufo I. F., Member of Congress from American Samoa. Statement Before Public Lands Subcommittee, House of Representatives Interior Committee on Compact of Free Association, March 7, 1985, pp. 2 and 3.

The problem arises in connection with Guam's largest power generation facility--the "Cabras facility"--which can meet the continuous control of sulfur dioxide emissions only by burning more expensive lower sulfur fuel, or by installation of a scrubber unit. The latter alternative is the least expensive, but it would involve an initial cost of $20 million and additional annual maintenance charges of $2 million. This would cause increases of 1.16 cents per KWH for the average consumer--about 9 percent above current rates. The argument is that, "Continuous control represents an unnecessary environmental standard for a tropical Pacific Island where normal trade winds blow emissions far out to sea." Guam's proposal is that it be allowed to burn less costly high sulfur fuel when the trade winds blow.[6]

Puerto Rico and the Virgin Islands. Puerto Rico argues that:

> The environmental laws and regulations of the United States should be modified so as to make them more responsive to physical and social conditions in Puerto Rico. In terms of physical characteristics, social priorities and economic factors there are many differences between the U.S. mainland and Puerto Rico.[7]

With respect to air pollution controls, Puerto Rico's objection in 1979 was to costs involved--for private industries which it needs to induce to move to Puerto Rico, and for public utility facilities. Even when occasional waivers are secured, there are conditions which must be met; there must be action by the Administrator of EPA; and court challenges may be necessary.

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[5] Guam Business Men/Department of Interior/White House Conference, April 14-15, 1982. Documents Used in Conference. Unpublished Compilation, Office of Territorial Affairs, Department of Interior, Concept Paper on "Power Generation" Constraints, p. 2.

[6] Ibid., pp. 3 and 4.

[7] Economic Study of Puerto Rico, op cit., p. 221.

The arguments appear to be on economic grounds rather than on grounds that there are physical differences between Puerto Rico and the mainland.

With respect to water pollution controls, a principal concern of Puerto Rico (and of the Virgin Islands) is with respect to controls applicable to the rum industry.

Traditionally, wastes have been eliminated through ocean disposal. The argument is that for island communities permits to discharge wastes in this fashion should be granted on a general basis. (Congress disagreed in 1977 and required that EPA conduct a study of the discharge problem.[8] In 1982, however, as part of CBI concessions to Puerto Rico and the Virgin Islands, effluents from the rum industry were permitted to be discharged into the ocean.

An additional Puerto Rico concern related to waste discharge of sewage into the deep sea was expressed in 1979. The argument was that almost half the population of Puerto Rico had no sewer service, and were required to use latrines, or illegal discharges through storm and sanitary sewers. Priority, therefore, should not be given to the secondary treatment of sewage but should rather be given to extending facilities to permit deep sea discharges for a larger share of the population.[9]

Still another example of the impact of general EPA policies on Puerto Rico was reported in an article in the San Juan Star on January 6, 1986: The federal government had made a decision to lift a ban on importing pesticide-ridden mangoes from Caribbean countries, but the ban was left in effect for Puerto Rico and U.S. territories. The result was that Puerto Rico (which was required to fumigate its mangoes in order to clear them for export to the

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[8] Ibid., pp. 223 and 224.

[9] Ibid., p. 224.

United States) was at a very substantial disadvantage by comparison with its Caribbean competitors.[10]

LABOR AND EMPLOYMENT POLICIES

U.S. labor and employment policies with the greatest effect on the territories are:

- The Fair Labor Standards Act of 1938 (FLSA), which prescribes minimum wages and overtime compensation for employees engaged in commerce and eliminates oppressive child labor.
- The importation of alien workers on H-2 visas.

The FLSA applies to Puerto Rico and to all the territories. But the problem of major consequence, based upon the ongoing study by the Department of Interior Solicitor's office:

> . . . is the uneven application of the Act to the Pacific territories, where some employers (notably in Guam at present) are disadvantaged in relation to employers in other areas. . . .[11]

Guam's concern with the FLSA, expressed in an April 1982 meeting of Guam businessmen with Department of the Interior and White House representatives, is that the FLSA sets minimum wage and workweek standards for Guam that do not apply to neighboring islands or in nearby countries.[12]

Guam's economy is tied not so much to the United States as to the economics of its neighbors. The FLSA forces wages up in tourism and light manufacturing. Tourism in Asia is very "price-sensitive" and nearby developing island tourist "paradises" are able to offer tourists more for their money than Guam.[13]

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[10] San Juan Star, Jan. 6, 1986. "Mango Industry Could Incur Loss Because of Ban," pp. 1 and 12.

[11] U.S. Department of Interior, Office of Solicitor. Analysis of Federal Laws as They Affect U.S. Possessions. Memorandum No. 29-95, "Fair Labor Standards" (29 U.S.C. Sections 201-219). Unpublished study. Part of larger study by Ruth Van Cleve, Associate Solicitor.

[12] Documents Used in Guam Business Men/Department of Interior/White House Conference, op cit., Concept Paper on "Labor Constraints," p. 2.

Essentially the same argument is made by representatives from the Virgin Islands.[14]

Alternative solutions proposed are for Guam labor rates to be exempt from further increases in the U.S. minimum wage law; or that wage rates be set by "industry committees" appointed by the Secretary of Labor (as is the case in American Samoa).

Another solution, contained in Guam's proposed Commonwealth Act, is to retain U.S. labor laws but permit Guam to amend them as the legislature deems appropriate, so that the Commonwealth would have jurisdiction that would permit it to reject federal changes in statutes that are considered harmful locally.[15]

Employers in CNMI are not subject to federal minimum wage laws (except for the federal government and its contractors). As of 1984, a locally-imposed minimum wage of $2.15 per hour was in effect.[16]

American Samoa, as noted, is authorized to use industry committees which may set lower wage rates than specified by the FLSA.

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[13] Ibid., p. 4.

[14] Interview with James Pobicki, Director of Office of Policy Planning and Research, U.S. Virgin Islands Department of Commerce.

[15] Bordallo, Honorable Ricardo J., Governor of Guam. (Testimony before Joint Economic Committee, Subcommittee on Trade, Productivity and Economic Growth, U.S. Congress, Sept. 10, 1985, p. 4. (Mimeographed document presented by Edward D. Keyes, Lt. Governor of Guam.)

[16] Northern Mariana Islands Commission on Federal Laws. Welcoming America's Newest Commonwealth (2nd Interim Report of the Commission to the Congress of the United States). Washington, D.C., August, 1985, p. 19.

Puerto Rico has seemingly come to terms with the coverage by FLSA. However, in 1938 when Puerto Rico became subject to minimum wage legislation, its average hourly wage rate was 25 cents, compared with 63 cents on the mainland. The problem was initially solved through the establishment of tripartite committees (industry committees) with representatives from labor, management, and the public sector who reviewed wages and, after public hearings, recommended to the Wages and Hours Administration suitable minimum wage rates for individual industries engaged in interstate commerce. Differentials were gradually reduced, and by December 1977, the large majority of workers covered by the minimum wage laws were subject to the same rate as in the United States.[17]

The conclusion reached in The Economic Study of Puerto Rico is that FLSA rates caused higher wage rates for Puerto Rican workers, but that higher wage levels tended to curb unskilled employment opportunities in labor intensive industries, and that this fact is at least partially responsible for the high unemployment rate in Puerto Rico--particularly among those workers in lower age groups.[18]

What Guam refers to as its "Alien Worker problem" relates to the fact that alien workers (particularly in the construction industry) are brought into the territory on visas when native workers are not available.

The problem occurs at least partially because there is a lack of programs to encourage learning of construction skills in Guam, and even if there were non-American contractors competing with American contractors required to abide by minimum wage laws, can perform jobs more cheaply.

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[17] Economic Study of Puerto Rico, op cit., p. 218.

[18] Ibid., p. 220.

In testimony before the Joint Economic Committee on September 10, 1985, representatives from Guam recommended several solutions:

- Congress should direct a study to measure the impact alien workers are having on the island's economy;

- H-2 workers be permitted to enter Guam only when construction activity reaches specific levels;

- There be strict limitations on the length of time an alien worker may be employed in Guam;

- Alien workers not be permitted to change their visa status while in Guam; and

- A "local employee" requirement be met by those seeking to import alien workers, so that hiring of alien workers would not cause replacements of natives but would result in employment of additional natives.[19]

While there are a substantial number of alien workers in the Virgin Islands, there does not appear to be the same concern that Guam has, perhaps because unemployment in the Virgin Islands has not been as much of a problem for the past twenty years. Also, the alien workers are almost all employed in a large variety of low-level jobs that American Virgin Islanders have traditionally avoided.

A contributing factor has been the continued growth of the Virgin Islands economy since 1960 and the large numbers of native Virgin Islanders employed by the Virgin Islands government, which is described by some as "an employer of last resort" for native Virgin Islanders.

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[19] Guam Chamber of Commerce. Statement submitted to Joint Economic Committee, Subcommittee on Monetary and Fiscal Policy, and Subcommittee on Trade, Productivity, and Economic Growth, Sept. 4, 1985, pp. 4 and 22. Also Documents Used in Guam Business Men/Department of Interior/White House Conference, op cit., Concept Paper on Labor Constraints, p. 5.

With the current fiscal problems of the Virgin Islands, that are expected to constrain further government growth, there is far greater concern with problems of training native Virgin Islanders for private sector positions, and problems similar to those described in Guam may develop in the future.

IMMIGRATION POLICIES

Territorial problems with U.S. immigration policies are covered partially in connection with the discussion on "Labor and Employment Policies."

Guam, however, has additional problems with U.S. general immigration policies. One of these is the "visa waiver" problem, that was partially solved in the Fall of 1984. P.L. 98-454 (Omnibus Bill, Provision 602) provided for a waiver of non-immigrant visas for Guam. Implementation, however, is still in progress. In August 1985, the Interior Department sponsored a conference on Guam to discuss what could be done under the law and within administrative regulation to improve Guam's tourism potential. The task force has recommended that Guam encourage visa free travel to Guam from some Asian countries and make use of a "Guam Only Entry Permit" from other countries.[20]

The proposed Guam Commonwealth Act, as explained in testimony before the Joint Economic Committee on September 10, 1985, would give local authorities control over entry of aliens. This would permit tourists (particularly Japanese) to get "Guam-only visas", which they could get more easily than U.S. visas.

Guamanian authority over immigration would also serve to control population growth. The Commonwealth proposal "seeks coordination with the military and United States foreign policy to prevent pressing the local infrastructure beyond reasonable limits."[21]

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[20] Guam Chamber of Commerce. Sept. 4 Statement to Joint Economic Committee, op. cit, p. 21.

Another immigration policy that poses problems in Guam is the application of a provision of the Immigration and Naturalization Act that prohibits alien crew members aboard U.S. flag tuna vessels from temporarily disembarking from such vessels for shore leave and recreation on Guam.

The same alien crew members, if aboard non-U.S. flag vessels, are allowed to disembark on Guam for shore leave. The original purpose of this provision was to prevent illegal immigration of aliens from South America on tuna boats through San Diego in the late 1940s and 1950s.[22] Guam states that this policy constitutes a severe impediment to the development of its fishing industry.

MARITIME POLICIES

Guam and Puerto Rico are subject to the "Jones Act" (46 U.S.C. 883 and 887), which prohibits foreign flag ships from carrying cargo between two U.S. ports. Both are subject also to U.S. vessel documentation laws which mandate that certain vessels used for certain purposes (e.g., dredges, commercial fishing vessels, and possibly tugboats) must be built within the U.S.[23]

American Samoa, CNMI, and the Virgin Islands are not subject to these constraints.

For Guam, operation of the Jones Act means that tuna purse seiners in the Port of Guam are forbidden to offload their catch onto foreign fish carrier vessels for transhipment to U.S. canneries in Puerto Rico and the West Coast. To escape the Jones Act, the fishermen are compelled to travel some 100 miles north to Tinian, in the Northern Marianas, to offload their tuna to foreign fish carrier vessels for shipment to other U.S. ports.

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[21] Bordallo, Honorable Ricardo J., Governor of Guam. Sept. 10 Testimony Before Joint Economic Committee, op. cit., p. 4.

[22] Guam Chamber of Commerce. Sept. 4 Statement to Joint Economic Committee, op. cit., p. 21.

[23] Ibid., pp. 18 and 19.

Guam states that the development of a fishing industry there is directly impeded by the Jones Act; that the differentiation between Guam and its American flag neighbors places Guam at an extreme and unfair cost disadvantage. Furthermore, U.S. flag vessels do not serve ports like Puerto Rico, to which Guam needs to deliver fish.[24]

The requirement that certain vessels (including fishing vessels) be built in the United States severely handicaps Guam's locally-based fisheries industry. Residents of Guam are unable to purchase new fishing vessels because of the prohibitive costs involved in purchasing such vessels in the United States.

The same requirement with respect to dredges means that dredging activities have been severely retarded.[25]

Puerto Rico

The cost of maritime commerce between Puerto Rico and the U.S. mainland has been a long-term irritant to the Commonwealth of Puerto Rico. Puerto Rico is dependent on maritime transportation for about 99 percent of its external trade, and between 80 to 85 percent of this trade is between Puerto Rico and the U.S. mainland.

Puerto Rico states that shipping in U.S. flag vessels is more expensive than shipping in foreign vessels, and U.S.-built ships cost more than foreign-built ships. As long as Puerto Rico is restricted to shipping in U.S. bottoms and purchasing vessels from U.S. shipyards, the island's shipping costs are higher than they should be, and the economy of the island is harmed.

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[24] Ibid., p. 18.

[25] Ibid., p. 19.

The 1980 Economic Study of Puerto Rico notes that in international trade, the federal government provides direct subsidies for U.S. shipping where U.S. shipping competes directly with foreign flag vessels. Puerto Rico argued in 1979 that it should be eligible for similar subsidies to offset the disadvantages it incurs because of the Jones Act.[26]

From the information available, the applicability of these maritime policies to one of the territories and Puerto Rico is hard to justify. The policies were presumably adopted in the first place to preserve a shipping capability in the United States. This may still be a valid reason for the general policy, but the policies seem to affect unfairly those islands which depend heavily on sea transportation, and the rationale for applying the policies to two of the islands and not to two others is not apparent.

TAX POLICIES

Guam, American Samoa, and the Virgin Islands are all subject to a "mirror" income tax system, so called because individuals and corporations are subject to the U.S. Internal Revenue Code (IRC), although all the revenues go directly to the territorial governments.

This means that each time Congress changes the tax laws or the Internal Revenue Service issues a ruling, residents of these islands are affected to the same extent as state residents.

Concerns about this arrangement differ among the territories. Guam complains that: (1) The mirror tax system is too complicated and difficult to administer; (2) U.S. tax treaties do not apply to Guam; (3) the IRC is inappropriate to Guam's economic situation and lacks flexibility; and (4) the mirror tax system does not raise adequate revenue.[27]

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[26] Economic Study of Puerto Rico, op. cit., p. 214.

[27] Documents Used in Guam Business Men/Dept. of Interior/White House Conference, op. cit., Concept Paper on "Tax Structure," p. 1.

Guam points out that the IRC contains literally thousands of complex provisions, only a fraction of which apply directly to Guam (or to the other islands).

Furthermore, because the IRC is drawn to deal exclusively with states of the U.S., there are many complications in applying the IRC fully to territories which do not fit the normal state pattern and are subject to different organic acts. Such complications have surfaced, and astute tax lawyers use loopholes for tax avoidance purposes.

Territories also wish to administer their own tax systems. Inevitably, there are administrative problems that arise when taxpayers move to or from the territories. In Guam and the Virgin Islands, the staffs in the tax offices lack the basic training and opportunities for ongoing training that are part of the U.S. Internal Revenue System's operations.

The U.S. operation is heavily computerized. Territories lack necessary interfacing capabilities.

One solution proposed--to have the U.S. Internal Revenue Service administer the tax systems in the territories--was proposed separately by Representative Burton and Senator Bennett Johnston of the U.S. Congress. The idea was turned down, however, as reactionary and colonialistic by both Guam and the Virgin Islands.[28]

Finally, the claim is made by Guamanian business and government leaders seeking to attract companies and industries to Guam from Asia that the complex mirror tax system turns away potential investors who favor areas where corporate rates are set at a reduced flat level and tax codes are simplified.[29]

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[28] Ibid., p. 7.

[29] Ibid., pp. 3-5.

The Virgin Islands Government has opted to retain the mirror tax system. It has, however, argued, along with with Guam, that macroeconomic considerations that call for tax cuts in the United States in order to stimulate the economy are inapplicable to local situations. In 1977 and 1978, the Virgin Islands Government successfully claimed that it was entitled to reimbursement for revenues lost because of reduced tax rates made for U.S. fiscal policy considerations, and it received payments of a total of $22 million for these two years.[30]

There is apparently little chance, however, that the Virgin Islands will be able to secure additional funds from the U.S. Government to make up income tax losses due to lower rates established in 1981 through 1983 by the U.S. The fact is that the Virgin Islands Government could have started in 1981 to make up a portion of such losses if at the time the tax reductions took effect it had added surtaxes to both individual and corporate income tax rates, up to its 10 percent limit.

The mirror tax system became applicable to the CNMI on January 1, 1979, with the qualification that residents of the CNMI, including corporations, were temporarily exempted until January 1, 1985 from payment of local territorial taxes on income derived from sources within the Northern Mariana Islands. In the Second Interim Report of the Northern Mariana Commission on Federal Laws made to the U.S. Congress, the statement is made that prevailing sentiment in the CNMI opposes imposition of the mirror tax and favors instead development and implementation of a locally-developed tax system. The report also notes that allowing the CNMI to replace the mirror tax with its own tax system "may give the Northern Mariana Islands an unfair advantage over Guam, unless Guam is given similar authority."[31]

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[30] Interview with Ms. Clovis Emanuel, Revenue Control Officer, Virgin Islands Budget Office, April 29, 1986.

The initial reasons for the use of a mirror income tax system are not clear. It did provide an automatic way for Americans in the territories to pay income taxes that would revert to the territories in which they were living.

The system tends to disguise the fact that assigning federal income taxes to a territory in which they are collected is a federal contribution to such territory. Residents of states, by comparison, pay federal income taxes to the U.S. Government. Revenues to states and local governments must be raised through other means--sales taxes, real estate taxes, state (or local) income taxes, etc.

On the negative side, criticisms made by representatives of Guam have considerable merit. The mirror tax system is complicated and causes extra administrative problems between the U.S. tax collecting agency and local tax collectors; it has no necessary relationships with the genuine requirements of the territories; and it is subject to changes for reasons that have nothing to do with the fiscal situations in the territories.

There are possible local options by the territories to mitigate the adverse effects of the mirror system. Territories are free to levy other taxes: gross receipts taxes, real estate taxes, excise taxes, etc. And they may add surtaxes to the U.S. income taxes, up to 10 percent of the federal income tax calculation.

Use of Section 936 of the IRC as an Investment Incentive

A different aspect of the application of U.S. tax policies to the territories and Puerto Rico is the use of Section 936 of the IRC as an investment incentive. This section permits U.S. corporations to receive full tax credits on income earned in Guam, CNMI, American Samoa and Puerto Rico, subject to certain conditions. The U.S. Virgin Islands is given a more restrictive incentive at present under Section 934, which originally required a 30 percent withholding tax on corporate income earned in but withdrawn from the U.S. Virgin Islands. This 30 percent withholding tax was later reduced to 10 percent as a part of CBI negotiations between the Virgin Islands and the United States.

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[31] Northern Mariana Islands Commission on Federal Laws, op. cit., p. 415.

Puerto Rico relies very heavily on the incentives of Section 936. For example, the January 1986 issue of Fortune Magazine carries an ad stating, "Now the Door's Open Even Wider for American Business." Listed incentives are: "No U.S. corporate income tax on earnings in Puerto Rico." "Local tax exemptions start at 90% of industrial development income." "No quotas, no duties, to $3.8 trillion U.S. market."

It isn't clear why income tax incentives to corporations were originally less for the U.S. Virgin Islands than for the other islands. In the tax reform bill passed by the House of Representatives at the end of 1985, Section 936 benefits are extended to the U.S. Virgin Islands on the same basis as to the other islands.[32]

American Samoan representatives have stated that if the benefits of Section 936 of the IRC were removed, American Samoa's only industry--its tuna canning operations--could not survive.[33]

The delegate from American Samoa also points out that under the Compact of Free Association Between the United States and the Federated States of

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[32] San Juan Star Newspaper, Dec. 26, 1985, p. 42. Article entitled, "V.I. Sees 936 as Opportunity to Compete with P.R."

[33] Sunia, Honorable Fofo I. F., Member of Congress from American Samoa. Statement Before Senate Committee on Finance on Sec. 936 of the Internal Revenue Code, The Possession Tax Credit, Oct. 3, 1985.

Micronesia and the Marshall Islands (Section 255), those provisions of the IRC which applied to United States possessions on January 1, 1980 would continue to apply to the Marshalls and the Federated States of Micronesia (FSM). Further, if the U.S. Government has amended, modified or repealed these 1980 provisions, they will continue in effect for the FSM and the Marshalls for two years, during which time the United States will negotiate with the Marshalls and the FSM an agreement to provide benefits substantially equivalent to those obtained under such provisions.[34] Also pointed out is that the favorable 1980 possession tax credit of Section 936 of the IRC would remain intact to benefit businesses in the new Associated States, even though the Reagan Administration had as part of its tax reform measures in 1985 proposed to drop the provisions for American Samoa, Puerto Rico and the Virgin Islands.

CUSTOMS POLICIES

U.S. customs policies contain examples of macroeconomic policies that provide incentives and disincentives to trade and business in Puerto Rico and the territories.

Puerto Rico is within the United States Customs Zone. Guam, American Samoa and the Virgin Islands are not. There are both advantages and disadvantages to being within the U.S. Customs Zone.

"Being within the zone" means that tariffs set for the United States apply equally to Puerto Rico on all items imported into the United States. It also means that there are no customs duties charged on shipments from Puerto Rico to the U.S. (or vice versa).

The territories are treated for customs purposes essentially the same way that foreign countries are, although there are special preferences given to individual territories. They are, however, subject to quotas; items purchased locally are subject to duty when they are taken or sent to the United States; and travelers and importers are required to "declare" items when they enter the U.S. Customs Zone.

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[34] Sunia, Honorable Fofo I. F., March 7 Statement on Compact of Free Association, op. cit., pp. 7-8.

The Virgin Islands pays the Customs Bureau to operate the customs service for the Virgin Islands, but the administration of local customs leaves something to be desired. A large loophole exists because of domestic postal shipments of foreign goods to the Virgin Islands. The customs regulations provide for inspection of Virgin Islands domestic parcels, but this is not done, presumably because Post Office regulations do not permit it.[35]

One of the special benefits available to Guam and other insular territories (including American Samoa and the Virgin Islands) is Headnote 3(a) of the U.S. Tariffs Schedule. This provision permits insular possessions of the United States outside the U.S. Customs Zone to export to the United States and its customs territories products manufactured in the territories. The definition of products "manufactured" requires that a specified percentage of the value of the product manufactured be added within the territory. In Guam in 1984, for example, at least 70 percent of the value of the product manufactured (30 percent for watches) had to be added by Guam manufacturers. Territories argue for reductions in values that must be added by local processing, since they wish to have flexibility in importing parts or components from other locations.

A problem with this program is that:

-- Quota restrictions are easily imposed by agencies or branches of the federal government. For example, if U.S. textile manufacturers were successful in limiting quantities of textile manufactured goods that could be imported into the United States, Guamanian textile manufacturers would be assigned quotas just as other foreign exporters would be.

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[35] James Pobicki Interview, op. cit.

-- Rules can change. This means that potential investors in Guam must be leery of investing in new industries that rely on the U.S. market when there is the possibility that they may be shut off from that market in the future.

One of Guam's solutions is that industries fostered by the Headnote 3(a) provisions be protected against quotas or other actions interfering with their free import into the U.S. Customs Zone.[36]

An alternative solution, presented in conjunction with the proposed Commonwealth Act for Guam, would be to place Guam outside the U.S. Customs Zone with respect to foreign commerce, and inside with respect to commerce and trade with the United States.[37]

An advantage enjoyed by territories outside the U.S. Customs Zone is that they are not required to follow tariffs set by the United States, and can in fact set up duty-free ports as attractions to tourists. Thus, Guam, in proposing in its Commonwealth Act to be outside the U.S. Customs Zone for foreign commerce proposes that it retain an option that it enjoys at the present time--one that can have a significant impact on tourist business.

This option is extremely important to the U.S. Virgin Islands, particularly to St. Thomas, where tourism is the primary industry and where tourist shopping is the largest single contributor to tourist revenues. The Virgin Islands, therefore, do not wish to be in the U.S. Customs Zone.

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[36] Guam Chamber of Commerce, Sept. 4 Statement to Joint Economic Committee, op. cit., p. 20.

[37] Bordallo, Honorable Ricardo J., Governor of Guam. Sept. 10 Testimony Before Joint Economic Committee, op. cit., p. 3.

The Virgin Islands are interested in protecting their advantages over other duty-free locations, however. And, on April 27, 1981, after being contacted by a prominent Virgin Islands tourist retailer, Senator Bennett Johnston objected to increases in value limits on amounts of foreign purchases that can be brought into the United States duty-free by U.S. tourists. These free limits doubled--to $400.00 per person. In addition, there was no effective limit on the numbers of $50 gifts that could be sent back from overseas destinations by American tourists (also duty-free).

The objection, placed with the Senate Finance Committee,[38] noted that value limits set by other nations on how much their tourists could buy in the U.S. to take back duty-free to their own countries had not changed, and were far below U.S. allowances. Indeed, for a number of countries a reverse situation was occurring. Their nationals were being restricted on amounts of money they could take out of their countries.

These considerations, plus substantial increases in the value of the American dollar compared with other foreign currencies in 1983, 1984 and much of 1985, provided incentives for American tourists to travel to Europe, Mexico, and other non-dollar-related destinations, and correspondingly reduced incentives for travel to U.S. territories such as the Virgin Islands.

As pointed out by Senator Johnston, the liberalized customs policy resulted in increasing the unfavorable balance of trade between the United States and foreign nations.

POLICIES AFFECTING THE FINANCING OF ECONOMIC DEVELOPMENT

A matter of major concern to the Virgin Islands is the financing of economic development, not so much for hotels and tourism projects, but for industrial development.

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[38] Johnston, Senator Bennett. Letter of April 27, 1981 to Chairman, Senate Finance Committee.

Other Caribbean economies have access to U.S. and other foreign aid programs and development bank financing mechanisms. The Virgin Islands must rely solely on normal United States domestic programs and private capital sources.[39]

Guam representatives point out that other developing countries benefit frequently from bilateral foreign aid offerings or from international agencies concerned with economic development (such as the World Bank and the Asian Development Bank). Development financing means access to low-cost funds available for investment into long-term, often initially low-yielding, development projects. Access to the funds and the technical expertise required to manage such funds are required. Guam argues that it should be able to:

-- Become a member of the Asian Development Bank

-- establish a Guam Development Bank as the successor to the Guam Economic Development Authority and the federally-financed Economic Loan Fund(s) for Guam.[40]

Guam objects to other U.S. policies that prevent it from joining a possible common market in cooperation with its neighbors. Constraints are:

-- Guam cannot enter into agreements with her neighbors without approval of the U.S. State Department.

-- Guam cannot import aquacultural and agricultural products from the Federated States of Micronesia because of Agriculture Department regulations.

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[39] James Pobicki Interview, op. cit.

[40] Documents Used in Guam Business Men/Dept. of Interior/White House Conference, April 1982, op. cit., Concept Paper on Development Finance, p. 2.

-- Guam cannot serve as a transshipment center because of restrictive maritime laws.

Yet Guam's stores have many of the goods that its neighbors want. A free-trade region--a Pacific Island Common Market--would be a sensible solution to obstacles to free trade in the Pacific Island region, but Guam is precluded from joining such a market because of existing U.S. policies.[41]

Puerto Rico and American Samoa appear to be less affected by United States macroeconomic policies in this area. The reasons are very different:

American Samoa has essentially only one major industry--tuna canneries. The key to successful investment there is Section 936 of the IRC.

Puerto Rico has a rather extensive history of assistance from the United States in aiding its economic development financing and is able to make use of subsidized factory buildings, low indirect rate financing, tax incentives, and the income tax benefits of Section 936. Puerto Rico's sophistication in this regard is exemplified by its ad in the January 1986 Fortune Magazine previously referred to. The ad states that:

> [Puerto Rico] is committed to the same comprehensive tax-incentive policies and infrastructure buildup that have attracted companies to Puerto Rico for 40 years. And now we're implementing an "outreach" program linking our highly skilled work force with the lower-cost labor production of our Caribbean neighbors.

The ad refers to the "twin plants" program concept used by Puerto Rico representatives to support arguments for continuing Section 936. The "twin plants" program takes advantage of lower-cost labor to perform unskilled operations in Caribbean islands and countries neighboring Puerto Rico. The skilled operations needed to finish products would be done in Puerto Rico, such that value-added provisions of the law would be met.

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[41] Duenas, Senator Edward R., Minority Leader, Guam Legislature. Statement submitted to Subcommittee on Trade, Productivity and Economic Growth, Sept. 6, 1985. 4th page of unnumbered manuscript.

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

1. Successful implementation of a federal government policy to promote and encourage renewable resource development in the territories and Puerto Rico will require a careful review of existing U.S. macroeconomic policies as they relate to these entities. To quote from a Guam document used for purposes of a conference with White House and Department of Interior officials in 1982:

> Nearly forty years of direct federal intervention has resulted in a crazy-quilt of regulations and programs which have created economic contradictions which must be resolved to allow greater business development. . . .[42]

The examples cited in this study support this general criticism.

2. There are many examples of inconsistent applications of U.S. macroeconomic policies to Puerto Rico and the territories. In its February 1985 report, the General Accounting Office stated:

> GAO found that there is no federal policy which details how the territories should be treated in formulating and extending laws and programs. Territory officials identified instances when federal policies, laws, and programs have constrained economic and social development because they were inconsistently applied, insensitive to unique territorial circumstances and needs, or inappropriate for local conditions. . . .[43]

3. There are substantial differences among the individual territories and Puerto Rico in their physical, geographical and sociocultural characteristics, as well as in their stages of development. Decisions as to how U.S. general macroeconomic policies should apply to these entities apparently have not always allowed for such differences.

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[42] Documents Used in Guam Business Men/Dept. of Interior/White House Conference, April 1982, op. cit., "Constraints Analysis," p. 1.

[43] U.S. General Accounting Office, op. cit., p. iv.

4. In making changes to existing policies and programs, or in developing new policies and programs affecting economies of the territories and Puerto Rico, Congress must base its decisions and actions on all relevant factors: U.S. legal responsibilities; U.S. national security considerations and objectives; territorial aspirations; commitments to self-determination; the interrelations between national interests and territorial interests.

These factors will inevitably impinge upon the adoption of U.S. policies promoting and encouraging renewable resource development in these entities.

RECOMMENDATIONS

1. The current project within the Department of Interior analyzing the impact of federal laws on the territories should be extended to include Puerto Rico and should be expedited.

2. The effort to promote renewable resource development should focus on each of the islands separately, recognizing that Puerto Rico, Guam, the Virgin Islands and American Samoa are quite different in terms of development, culture, resources and aspirations.

3. The need for uniformity in the application of U.S. macroeconomic policies to Puerto Rico and the territories should be subordinated to considerations of fairness and to the unique situations in each of the entities involved.

4. In the event of a major review of the economic development of a specific territory (such as may currently be appropriate for Guam), a commission similar to the Northern Mariana Islands Commission on Federal Laws might be the most appropriate mechanism for providing Congress with the background necessary to establish appropriate policies and programs.

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Background Paper No. 8

THE INTEGRATION OF CUSTOMARY AND TRADITIONAL RENEWABLE RESOURCES PRACTICES IN A MODERN LEGAL FRAMEWORK

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Abstract

The experience of the State of Hawaii demonstrates that the unequivocal adoption of a western system of law may be destructive of any attempt to retain traditional means of resource allocation even if a commitment to the retention of such customary rights and practices are explicitly preserved in the statutes or constitution of a Pacific Island jurisdiction.

In Hawaii, the failure to effectively retain elements of the traditional means of resource allocation resulted from 1) the absence of a system of enforcement which was readily available to the beneficiaries of the rights, 2) the judicial interpretation of native rights as inherently limited by western precepts and principles, 3) the failure to provide for the continued vitality of the rights and privileges in an evolving economy and society, and 4) the absence of a comprehensive understanding of the place of such rights and privileges in the legal, economic and social development of the state.

The relative autonomy of Pacific Island communities provides an opportunity to avoid what occurred in Hawaii. This might be accomplished by the incorporation of the rights and principles embodied in traditional practices within the fundamental precepts governing adjudication and resource allocation.

A theoretical model for the accommodation of custom within the rule of law is suggested in this paper. The model is predicated upon accepting custom as reflecting the primary principle by which decisions are to be made.

THE INTEGRATION OF CUSTOMARY AND TRADITIONAL RENEWABLE RESOURCE PRACTICES IN A MODERN LEGAL FRAMEWORK

INTRODUCTION

The purpose of this paper is to examine custom within a regime of law in the context of natural resource management in the Pacific. The thesis presented here is that custom is a precious asset and that an Anglo-American system of law can be, but need not be, destructive of that asset.

The Hawaii experience is particularly instructive on this point. As one of the first island nations to feel the full impact of a foreign legal system, Hawaii has experienced a deterioration of customary land and natural resources practices. Other American territories in the Pacific can learn from this experience. The emerging movement toward self-governance in Micronesia and the attempt to retain traditional values in American Samoa presents an opportunity of merging the best of traditional practices with the rule of law.

This paper will begin by discussing the history of displacement of native practices in Hawaii. A theoretical explanation of the function of law and of custom will follow. This paper will conclude with a suggested methodology for preserving custom within the context of the rule of law.

THE HISTORY OF RETENTION OF NATIVE RIGHTS IN HAWAII: AN EXAMPLE OF THE DEMISE OF CUSTOMARY PRACTICES OF NATURAL RESOURCE ALLOCATION

The essential inseparability of concepts of native "rights" from the maintenance and survival of the culture from which those rights evolved is demonstrated in the development of the law relating to native Hawaiian rights. Lundsgaarde (1975) reaches the following conclusion regarding the relationship between land tenure and culture in the Pacific islands: "The native peoples of Oceania seem to have evolved a form of social and legal organization which precludes understanding and study of land tenure as a separate element of culture."

In Hawaii, an attempt was made to recognize and preserve important cultural prerogatives relating to property as the island community was subsumed by the West. The failure of these efforts is instructional. It represents the futility of isolating elements of a culture without taking care to create a context in which the culture itself might evolve and continue to nurture its people.

The Traditional System

Originally all power and property in Hawaii rested with the King. Large areas of land (ahupuaa), running typically from the mountains to the sea and including virtually every resource necessary for life, were ceded to lesser chiefs (alii). The chiefs collected tribute for themselves and the King from commoners who chose to live on and cultivate the land. The subsistence lifestyle of the commoners was rooted in their privilege to work the land, to utilize the waters of the ahupuaa to cultivate their crops, to gather materials which grew or could be found, and by fishing. With the introduction of western culture the labor and tribute of the commoners became of diminishing value. Instead, a commerce based on the cultivation of sugar and the exploitation of other natural resources bore the promise of wealth to those who ruled.[1]

The Mahele

This promise, together with threats of armed intervention by western powers, eventually led to the division of the islands' lands in fee simple in 1848.[2] As a part of the "Great Mahele," the kingdom's lands were divided between the crown and chiefs, to whom control of the ahupuaas had been delegated.

In the course of the decade that followed, various attempts were made to retain customary privileges associated with the native Hawaiian way of life as well as to protect the rights and interests of the commoners.

In 1851, commoners were given the right to own land that they had actually cultivated, traditional fishing rights were codified as were traditional practices with regard to access, gathering rights, and water rights. All grants and patents were made "subject always to the rights of the tenants." Virtually all the individual elements inherent to customary lifestyle of the native Hawaiian were thereby apparently preserved.

Claim to Land

A commoner or chief could claim the title to land by proof of his right to possession, the payment of a commutation to the King and satisfaction of certain formalities including a survey and filing. During the planning of the islands' division it was anticipated that the crown, the alii and the commoners would each ultimately be granted one-third of the islands' land.

When the division was ultimately completed less than one per cent of the land remained in the hands of the commoners.[3] The bulk of the Hawaiian people could not, or did not choose to, exercise their right to claim property. Many did not understand the foreign concept of fee simple ownership that was being imposed. Many did not have the funds necessary to pay for the required survey and commutation. Perhaps, some were never aware of the law.[4]

Even among those who did exercise their rights and claimed their "kuleana," the rapid evolution of the social and economic structures of the islands soon left the lifestyle associated with the land almost entirely without viability. Much property was ultimately sold at bargain prices or abandoned and lost under legal concepts such as adverse possession.

The alii fared only a little better. Without a full understanding of its value in a western economy, large areas of land were sold or leased for marginal prices to western capitalists. The capitalists became wealthy, and the alii ultimately faded as both a power and class.

The lands of the King were divided into personal lands and government lands. With the exception of substantial tracts which survived through inheritance and today represents the Bishop Estate, these lands were lost to non-Hawaiian governments which came to rule the islands at the turn of the century.

Today, no substantial land base for the native Hawaiian people remains.[5]

The Rights of "The People"

Hawaii Revised Statutes sections 7-1 originally accompanied the Act permitting tenants to come to own their land.[6] It appears to provide an outline of basic rights necessary for the maintenance of a traditional lifestyle.

> Where the landlords have obtained, or may hereafter obtain, allodial title to their lands, the people on each of their lands shall not be deprived of the right to take firewood, house-timber, aho cord, thatch, or ki leaf, from the land on which they live, for their own private use, but they shall not have a right to take such articles to sell for profit. The people shall also have a right to drinking water, and running water, and roads shall be free to all, on all lands granted in fee simple; provided, that this shall not be applicable to wells and water-courses, which individuals have made for their own use.

Standing alone, the statute seems to substantially alter the concept of fee simple ownership of land. Additionally, it could be interpreted as indicating an intention that traditional practices inherent in the culture of the native Hawaiian people were to be taken into account. Yet for over a hundred years after its original adoption, it meant almost nothing. When attempts were finally made to give them some meaning,[7] it was all but too late.

The ground rules for the interpretation of claims of native rights were established the first time the newly formulated western-style courts of Hawaii were confronted with the issue. In 1858, a tenant claimed the traditional right of pasturage on the undeveloped lands of the landlord. The system of fee system ownership unequivocally prevailed. The claim of custom was rejected: "For it is obvious to us that the custom contended for is so unreasonable, so uncertain, and so repugnant to the spirit of the present laws, that it ought not to be sustained by judicial authority."[8] The claim of any commonly held traditional rights was rejected because: "It was evidently the intention of the Legislature that whenever, in any case, a tract of land was divided between the several parties in interest, those rights which they had previously held in common ... should cease to be so held."[9] Moreover, a claim of right by virtue of a pre-mahele statute was dismissed as superceded by the enumerated rights of 7-1 which were declared exhaustive of all the rights (except fishing rights which had been reserved in another statute) reserved to the people.

Therefore, it was made clear that in the absence of explicit instruction to the contrary, the logic of private ownership would be treated as pre-eminent. Traditional purposes and prerogatives simply ceased to exist except to the degree that they were explicitly preserved.

Furthermore, it took the courts a long time to recognize those rights which were explicitly preserved in Section 7-1. The experience with regard to gathering rights and water rights--two critical elements of the native Hawaiian lifestyle which were apparently explicitly reserved--are instructive.

Gathering Rights

In December of 1982, the Hawaii Supreme Court issued the first and only interpretation of gathering rights reserved to "the people" by HRS 7-1. At issue was the place and nature of the ancient right of commoners to gather necessary items within an ahupuaa. The Court interpreted its task thusly:[10]

> The problem is that the gathering rights of (section) 7-1 represent remnants of an economic and physical existence largely foreign to today's world. Our task is thus to conform these traditional rights born of a culture which knew little of the rigid exclusivity associated with the private ownership of land with a modern system of land tenure in which the right of an owner to exclude is perceived to be an integral part of fee simple title.

In a fashion, this assessment characterizes the problem created by those who in the middle of the nineteenth century sought to maintain native Hawaiian rights in the face of the otherwise wholesale adoption of western culture. The probable incompatability of the two were never addressed. Limits on the scope and nature of the western system were never clearly established. How native rights were intended to evolve in order to preserve native integrity was never made clear.

The accommodation reached by the Hawaii Supreme Court attempted to give meaning to the right but may also have ultimately ensured its demise. The Court concluded that the gathering rights of 7-1 assured that "lawful tenants of an ahupuaa may, for the purposes of practicing native Hawaiian customs and traditions, enter the undeveloped lands within the ahupuaa to gather those items enumerated in the statute." In a footnote accompanying this conclusion, however, the Court was careful to also note that the rights "do not prevent owners from developing lands."[11]

The rights were therefore maintained. The practice, however, was made subject to the superceding right of property owners to utilize their lands. The practice of the right was therefore not assured. Furthermore, the application of additional qualifications appropriate to the native Hawaiian culture effectively limited the scope of the right in modern Hawaii.

Practitioners are required to reside in the ahupuaa in which the gathering right was to be exercised. This is a clear limit in the statute and consistent with traditional Hawaii. However, the utilization of boundaries which no longer exist either in law or culture imposes an artificial restriction which makes virtually no sense. Additionally, the requirement that the gathering be conducted in accordance with native Hawaiian "customs and traditions" is defensible but ensured that the practice will remain a quaint and harmless anachronism.

Arguably, the court had no choice but to adopt such a limited interpretation in an era in which the precedence of western property rights had been so absolutely established. Gathering rights had never before been litigated because they had never assumed a status of litigable importance. As their significance was diminished by the evolution of capitalist economy and concomitant culture, no similar evolution took place in the law to assist in preserving the essence of the practice. Gathering rights became an anachronism because such rights were not practically useful in the new capitalist economy. The anachronism was tolerated but not developed.

Water Rights

Until 1973, when the Hawaii Supreme Court attempted to impose a system of public ownership upon the bulk of Hawaii's water, the "peoples'" rights to water meant nothing unless the people happened to own the land upon which the water arose. Prior to that time, the surface waters of Hawaii were divided, according to judge-made law, based almost exclusively on the right of property owners to control that which existed on their land.

In a series of opinions stretching over the next ten years the Court attempted to undo the one hundred year development of private control of water. The result was a complex reformulation which attempted to recapture pre-western spirit and intention.[12]

Ironically, the system of exclusive private ownership was also alleged to have been a product of Hawaiian practices. However, there is little question that such native practices were far from private and exclusive:[13]

> Perhaps the essential feature of the ancient water system was that water was guaranteed to those natives who needed it, provided they helped in the construction of the irrigation system. Because agriculture was a matter of great importance to the Hawaiians, they were, in general willing to contribute their efforts to their water system. The konohikis aimed to secure equal rights to all makaainana and to avoid disputes .... (A) "spirit of mutual dependence and helpfulness prevailed, alike among the high and low, with respect to the use of water."

In its defense of the return to communal control, the Court attempted to come to explain what it saw as the "fundamental mistakes" which led to the deviation from native practice:[14]

> The western doctrine of "property" has traditionally implied certain rights. Among these are the right to use the property, the right to exclude others and the right to property with the consent of the "owner." In conformance with the creation of private interests in land, each of these rights were embodied in the delineation of post-Mahele judicial water rights. Ostensibly, this judge-made system of rights was an outgrowth of Hawaiian custom in dealing with water. However, the creation of private and exclusive interests in water, within the context of western concepts regarding property, compelled the drawing of fixed lines of

> authority and interests which were not consonant with Hawaiian custom.
>
> Thus, the distinction drawn between (legally enforceable) "rights" (which accrued to property owners) and "supplies by permission" or "favors" (which tenants received) ... while making perfect sense within a western understanding of "property," would make no sense at all under the ancient system of allocation. Under the ancient system both the self-interest and responsibility of the konohikis would have created a duty to share and to maximize the benefits for the residents of the ahupuaa. In other words, under the ancient system the "right" of a konohiki to control water was inseparable from his "duty" to assist each of the deserving tenants. The private division of land and the subsequent division of water allowed for the separation of this "right" from the concomitant duty.

Thus, over one hundred years after the mahele, the Hawaii Supreme Court attempted to reconstruct Hawaiian water rights in accordance with its vision of the King's probable intent and native practice. Water was classified as an essential public resource the allocation of which should result in a maximizing of mutual benefit.

The success of this twentieth century reconstruction is yet to be demonstrated. Pursuant to claims by property owners who had relied upon previous interpretations, the federal courts have ruled that the reconversion of Hawaii's waters into public property may constitute a taking of private proeprty in violation of the United States Constitution. While the United States Supreme Court has temporarily put a stop to federal judicial intervention in the development of Hawaiian water law in order for the State to clarify the application of these cases, the probable limits imposed by the federal constitution on the State's power to effectively alter pattern of disposition has been signalled.[15]

The Hawaii Supreme Court's opinions also served as a catalyst for the development of a statutory water code. While the Hawaii state legislature has yet to adopt such a code, recommended drafts have all but abandoned the language and objectives inherent in the attempts to resurrect anything resembling a native system of allocation. Instead, interests which have invested and relied upon the pre-existing system of private ownership and control, have rallied in support of retaining an allocation structure which preserves their investments and expectations.[16] The economic argument in support of such a code is likely to be most persuasive. As was the case when an attempt was made to first retain native Hawaiian rights, the value of recognizing and implementing elements of a system which would appear to be inconsistent with prevailing economic and social development seem most subject to question by those who must govern.

Other Rights

The 1960's and 70's were marked by other attempts by the Hawaii Supreme Court to resurrect native Hawaiian rights or property concepts which were viewed as consistent with traditional culture. A right of access to otherwise isolated kuleanas was recognized.[17] And the public's interest in Hawaii's shorelines was expanded.[18] But despite these courageous and important steps toward revitalizing long dormant reflections of a traditional culture, little has changed with regard to the status of the native Hawaiian or nature of the prevailing culture.

The economic structure and inherent legal restraints were too firmly established to be effectively assaulted by ancient constraints and an effectively extinguished way of life.

Summary, The Hawaiian Experience

With the coming of the influence of the west in the mid-nineteenth century, the leaders of Hawaii's native people appear to have attempted to preserve in law many native rights and practices. Yet despite these attempts and recent efforts to provide them with new vitality, the law of Hawaii is virtually devoid of any meaningful retention of native Hawaiian culture and Hawaii's native people occupy very nearly the lowest rung of the socio-economic ladder.

A number of reasons might be postulated for these failures. First, as exemplified by the failure of the common people to claim lands to which they were entitled, the native people were not able or willing to effectively exercise their rights in the face of an essentially foreign system of enforcement. The provision of the most expansive interests in property, ownership, meant nothing when there did not exist the power or knowledge to protect and effectuate these rights.

Second, native rights, privileges and practices were treated inherently limited by the rules and practices of Anglo-American jurisprudence. In the absence of explicit instruction to the contrary, the courts chose to treat native rights as applicable only when they did not effectively interfere with western concepts of law and property.

Third, rights and interests were not designed or permitted to evolve in such a fashion as to ensure their continued vitality. Gathering rights, fishing rights and rights of access are preserved as charming and sometime inconvenient anachronisms. No direction was provided or permitted with regard to the evolution of such rights in relevant contemporary privileges.

And fourth, there has not existed, and continues not to exist, any reason for the controlling culture or society (either the dominant internal culture or the world community) to encourage or facilitate the development of native rights and interests. The genuine value of the rights and perspective of the native people were never demonstrated or insisted upon. There never existed a comprehensive scheme which would be enforced and which sought to satisfy a long-term vision of how the culture was to evolve.

Lessons from the Hawaiian Experience

The issue of the integration of native practices in a western legal framework only arises because the world of the west has intruded upon the islands of the Pacific. In the case of some, this influence began as early as the 17th century. In virtually all cases they were characterized by the dissemination of native governance and a substitution of foreign rule. Unlike Hawaii, however, the potential for self-governance was never totally wrested from native people.

The Hawaiian experience makes it clear that issues regarding native rights cannot be considered apart from the surrounding social and political context. The isolated retention of traditional practices are likely to be meaningless, or worse, if the native peoples are left without the power to determine the development of their environments or inadvertently adopt the priorities and principles inherent in many elements of American law.

America's territorial holdings in the Pacific have achieved or are moving towards a degree of independence. Their choices regarding the retention of native rights and privileges may be significant not only in terms of cultural survival but also in terms of political and economic autonomy.

The Nature of Rights Retained

A reason for the loss of the relevance and vitality of native Hawaiian rights was their incompatability with the economic and social evolution of the surrounding culture. The retention of cultural anachronisms provided rhetorical satisfaction but it did nothing for the indigenous people. The essence of cultural practices were therefore lost insofar as they were designed and intended to serve as means of resource allocation and the maintenance of the identity of a people.

The Hawaiian experience teaches that the treatment of custom as quaint inconvenience will doom its vitality. Conversely, the serious consideration of custom as indicative of the guiding principles by which disputes are to be resolved and resources distributed could eventually lead to the express rejection of western concepts. That is, the principles inherent in custom might assume the role of the principles embodied in controlling documents such as the United States Constitution. Such documents would be very different from our own constitution in that they could reflect completely different values. The form of government could similarly be very different. Anything less may doom both custom and the culture.

Pulea (1985) in her discussion of current attempts to incorporate customary law in the Pacific repeatedly notes that resort to custom is utilized only in the absence of express law to the contrary and that virtually all such attempts have placed custom within the context of western systems. In such circumstances, it is not surprising that she repeatedly concludes that they appear to have had little impact.

The Samoan experience is instructional.[19] A commitment to the protection of the Samoans from the alienation of land has been present from the beginning of Samoa's relationship with the United States. Yet an increasing reliance upon the economic benefits provided by the United States together with curious frustration regarding the principles which should be applied in charting Samoa's future has led to a decline in the vitality of the system to the point where one author concludes that "the demise of the American Samoan culture appears unavoidable."[20]

In the Samoan case, the retention of culture was treated as an empirical exercise. That is, the personalities and observable manifestations of "culture" were expressly preserved and maintained. However, insufficient attention appears to have been given to the question of the desired outcome of this retention or the principles which were to be utilized in evolving cultural institutions. In essence, a coherent political philosophy is missing. In this absence, the wealth of the west together with the undeniable attraction of American "rights" may inevitably prevail and displace custom.

The "unavoidability" of such a result may therefore stem from a failure to recognize that the retention of custom must be accompanied by the conscious adoption of the desired result and guiding principles involved. It may also require the express recognition that both the result and principles are "un-American," that is, potentially antagonistic to American interests or fundamental principles (e.g. equal protection).

It is possible that it has been the conscious policy of the United States to avoid the possibility of genuine political, cultural, social, economic and philosphical independence in the Pacific islands.[21] Instead U.S. policy may simply have been explicitly or implicitly motivated by the desire to retain control over Micronesia and the other Pacific islands for the advantages they hold for the U.S. military.

If the disintegration or impotence of local cultures and values is determined to be the result of conscious manipulation by a foreign government, the folowing types of activities might be appropriate in order to establish a political and legal environment in which the role of traditional cultural prerogatives might be objectively assessed:

1) The fostering of an educational system which teaches traditional cultural values and consciously undermines the alleged sanctity of western ideological precepts.
2) The utilization and exploitation of foreign subsidies to maximize economic independence from the United States.

3) The development, under the pretext of codifying native culture, of a constitutional commission which would fully examine political and social structure with an eye towards developing an alternative political structure and philosophy which most appropriately manifests the people and their culture.

Such activities may contribute to avoiding the presumption of the inherent superiority of the western rule of law. By these means, a comprehensive and meaningful evaluation of the utility and value of native practices might begin.

CUSTOM AND THE RULE OF LAW IN EMERGING PACIFIC NATIONS: A THEORETICAL FRAMEWORK FOR THE PROBLEM OF RESOURCE MANAGEMENT

As emerging Pacific nations enter the world order as independent sovereigns, they turn increasingly to the Anglo-American concept of the rule of law to maintain social order, resolve disputes, and distribute resources. As noted in the preceding section, the danger that western law will undermine traditional practices and Pacific culture is a real one.

This section will discuss historical, economic, social, political, and philosophical questions raised by the relationship between law and custom, and will propose a methodology for preserving customary resource management practices within the context of a regime of law.

Introduction to Custom and the Rule of Law

As used here, "the rule of law" refers to the ordering of society by formalized rules, embodied in constitutions, statutes, and case law precedent; by principles knowable through the discrete analytical process called "legal reasoning;" and by adjudicatory procedures designed to discover, uphold, and promote legal rules and principles; in short, the system familiar to legal insiders--judges, lawyers, legislators--in Anglo-American culture.

This paper avoids the phrase "customary law" as an oxymoron, and uses instead the simple word "custom" to describe the traditional practices of a community that are so engrained in belief and behavior, so well-known to the populace, that they require no legislative decree, no police, no judge, no law library to exist and to shape social life. Law and custom are two different concepts. As anthropologist Stanley Diamond noted, the very purpose of law is to alter customary behavior, to get people to do what they would not ordinarily do given their culture and beliefs. (Diamond, 1974)

Historical Antecedents to the Importation of an Anglo-American Legal System: Functions of the Rule of Law

The definition of custom as accessible, culture-bound, accepted rules of behavior raises immediately the question of why anyone would want to import at all the oppositional system of Western law to displace or supplement an existing regime of custom. Historically, there are several reasons why human beings move to law.

For emerging nations, the primary impetus for adoption of Western legal systems is to estabish sovereignty and achieve legitimacy in the West-dominated world order. To Western eyes, nations with statutes, courts, and other trappings of legalism are civilized. Nations without these are primitive, in need of protection and control. The domination of a nation that has its own Western legal system looks a lot more like imperialism than the domination of a law-less, primitive state incapable of self-governance.

The struggle for self-governance in the FSM, for example, has focused, in part, on the issue of whether FSM courts are competent by Western legal standards, or whether the continuing protective jurisdiction of the Trust Territory High Court is required. (Bowman, 1983)

The emerging Micronesian nations have adopted wholesale various comprehensive American codes, such as the Federal Rules of Evidence and the Federal Rules of Civil Procedure. The appropriateness of these codes for use in Micronesia is not as important as their legitimizing function. A nation with American rules of procedure looks more and more like a proper democracy whose sovereignty deserves respect. The use of codification and adoption of Western law to achieve sovereignty is familiar to Pacific legal historians. (Matsuda, 1983)

A second function of the rule of law is the promotion of economic development. The rise of legalism throughout history is correlated with economic growth, industrialization, and the emergence of a class differentiated society. (Diamond, 1974) In the United States, for example, legal historians study the use of legal doctrine and the legal systems to promote railroads and other large industries. (Horwitz, 1977) (Hurst, 1984) While critics charge that the rule of law is a tool to increase production while concentrating wealth in a few hands, the instrumental value of law as a promoter is obvious to government leaders, and the Pacific Island experience will not avoid this function of law. This is particularly true when economic self-sufficiency is seen as the key to political autonomy.

Law promotes economic growth in several ways. The rule of law povides a stable, predictable environment for the operation of business. The adoption of the uniform commercial code in Guam, for example, assures business investors that the familiar rules of commerce will apply to transactions there. In addition to creating an environment familiar to business investors, law can actively promote certain activities by subsidy, tax advantages, and limited grants of privilege. If a Pacific nation decides, for example, to promote development of Ocean Thermal Energy Conversion, it can give subsidies, tax deductions, and exclusive use permits to OTEC developers.

A corollary to the power to promote is the power to deter. The rule of law represents a monopoly of coercive power: the power of the criminal law to punish, of the regulatory law_to prohibit, and of eminent domain law to take. Obvious uses of coercive legal rules in the realm of natural resource use include zoning laws, endangered species laws, pollution control laws, and building code laws. These coercive laws are used by governments to shape the path of development.

In addition to the needs for preservation of sovereignty and promotion of development, a third antecedent to adoption of the rule of law is an ideological acceptance of the value of law. In the United States, this ideological acceptance was a part of the revolutionary beginnings of the nation. The drafters of the

United States Constitution held a Lockian vision of a nation governed by agreed-upon rules and processes, rather than by privilege, caste, and autocratic whim. They believed in a system of laws arrived at through democratic processes, and saw power as legitimate only insofar as it conformed to the limitations of a written Constitution. Supporters of this vision argue that it allows orderly change and development and protects the inalienable rights of competing individuals within a society. This ideology--referred to as constitutionalism, process-based thinking, American liberalism, and legalism, among other names--is offered as a spiritual justification for adoption of the rule of law.

A final function of the rule of law is that it allows diverse peoples to live together by offering a substitute for the unity of culture in times of cultural dislocation and change. Max Weber said "law is the glue," in reference to the power of legal rules to provide social cohesion. In the United States, from the time the first colonial settlers arrived in ships carrying religious devotees, escaping debtors, indentured street children and others of opposing cultures and beliefs, it was necessary to adopt laws to control behavior in the absence of self-imposed cultural restraints. De Toqueville noted the American love of legal order in place of social constraints, and sociologists of law continue to record this phenomena. [Hurst, 1960]

In summary, there are several historical antecedents to adoption of the rule of law, and several reasons why Pacific nations might choose to adopt, in whole or in part, the system of law. In measuring the value of law, the voices of critics of the rule of law remind us to proceed cautiously.

Critique of the Rule of Law

As the Hawaii example reveals, law has tremendous power to dislocate and eventually destroy culture. This is particularly true when the Western system of law is imported into a community in which the citizens are unfamiliar with legal rules and unaware of the need to assert their rights.

Second, as a growing number of legal scholars are coming to believe, the ideology of the rule of law is riddled with fallacies. The most cynical critics argue that law is a tool of ruling elites for achieving their ends at the expense of the ordinary citizens. Others argue that the system, while not fundamentally flawed, is subject to abuse by powerful interest groups and manipulative lawyers, particularly in communities plagued by vast disparities of wealth.

The loosely affiliated group of scholars operating under the title Critical Legal Studies has organized the critique of the rule of law under a few guiding concepts. (Kairys, 1982) First, they argue that legal doctrine is manipulable and indeterminate. By this they mean that legal precedent, statutes, and processes of reasoning can yield conflicting results. They reject the myth that law is a fixed system for determining objectively correct answers, and cite examples of manipulability of law in American history. There are almost always legal rules that can support a particular outcome, they argue, thus those in positions of power are able to achieve the results they wish under the guise of legal legitimacy.

The obfuscatory, mystifying and legitimizing power of law is the second major tenet of critical legal studies. Law, it is argued, is a tool used to create the impression that essentially unfair results are justified because they were arrived at legally. Naked grabs for power are clothed in the garb of legal process, and the losers in legal battles may not legitimately claim that they were treated unjustly.

On a more hopeful note, some critical legal scholars believe that law is relatively autonomous, that law does have the power to challenge elite control and achieve genuine progressive ends. The civil rights movement of the 1960s is sometimes cited as an example of the relative autonomy of law to achieve just results.

The Need to Preserve Custom

Given the power of the rule of law to destroy custom, it is important to recall the reasons for preserving custom. Custom is typically the ordering mechanism used in communal, non-stratified cultures, such as those found in the islands of the Pacific. (Diamond, 1974) Custom is also the ordering mode of choice in most of the developing Pacific nations. Citizens are proud of their culture and traditions and express genuine sorrow at the passing of custom and dismay at the incursions of westernization.

Custom has worked for Pacific island peoples, it has maintained order, provided for the general welfare, created unity, and preserved a way of life. A sudden displacement of custom by law is likely to result in anxiety, cultural dislocation, and disorder.

Customary rules of resource management often have an ecological basis. Fishing taboos help preserve fish populations, use restrictions preserve delicate reef systems, and clan rights allocate scarce water resources. (Pulea, 1985) Restraints of custom are accepted and followed; restraints by law are often ignored. As one islander commented upon an endangered species law, "How does some man in Washington know how many turtles there are in Yap."

Pacific island law-makers have been careful to state explicitly their intent to preserve custom within the context of the rule of law. (See e.g., F.S.M. Constitution) Given the decision to preserve custom, the following section suggests an analytical system for judicial and legislative recognition of custom within the context of the rule of law.

Incorporating Custom in Law

The first question is whether it is possible to incorporate custom into the rule of law, or whether law is so antithetical to custom that this task is impossible. It is important to recognize the historical truth that custom, language, and culture are fragile, particularly in island communities of limited population.

In one generation, a society can lose a valuable cultural practice developed and refined over hundreds of years.

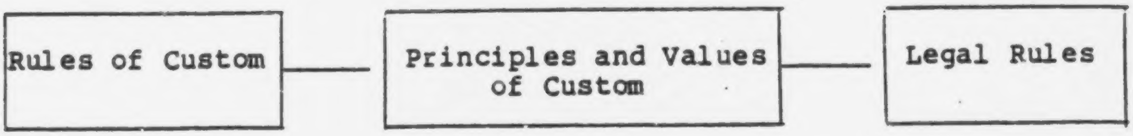
The thesis presented here is that explicit recognition of the value and fragility of custom, coupled with a formalized system for incorporation of custom into law, can result in the preservation of custom and traditional values. "Law" under this system will not look like law in the Anglo-American sense. What is needed is a new form of law, appropriate for use in societies rich with custom.

The first requirement in this new system is an explicit recognition, in constitutions, statutes, and case law, of the value and primacy of custom. Custom preceded law, and custom has worked successfully for island communities. Thus, the burden of persuasion should lie with those who oppose custom and who would suggest the displacement of custom by legal rules.

Statutes should also recognize and acknowledge custom whenever a new law is adopted. This explicit legislative reminder will guide the courts in interpretation of statutes.

The courts must see themselves as the last, and most important, line of defense for custom. Given the constitutional and legislative mandate for preservation of custom, the role of the courts is to follow that mandate by developing rules of interpretation that recognize the primacy of custom.

A basic system for interpretation is suggested in the following diagram:



This diagram represents the reasoning process of a judge mindful of the need to preserve custom. That judge will look first at the system of customary rules and derive from that system the underlying values and principles of custom. The judge will then use those principles and values to create legal rules operable within the system of the rule of law.

For example, there may be a rule on one island that strangers approaching a village at night must carry a lighted torch. The underlying value or principle represented here is that strangers must respect the peace of a village, and that in approaching, particularly at night, strangers should make their presence known to others. The judge may be faced with the question of whether a stranger approaching with a flashlight instead of a torch is privileged to proceed. Looking at the underlying principle, the judge may decide that the approach with an unfamiliar light is too potentially disruptive of community peace. On the other hand, given his knowledge of the village, the judge may find that the flashlight provided a light equal to that of the torch, and thus the underlying value and principle is preserved.

The point of this exercise is that the judge should always strive to find and preserve the essence of custom. The judge should take testimony from traditional leaders and community members familiar with custom, and the judge should use his own knowledge of the community to take judicial notice of custom. When in doubt, the judge should err on the side of preserving strict adherence to custom.

The reason for this process of distillation of the underlying principles behind customary rules is that rules necessarily change over time, while values generally remain constant. The Pacific island nations have experienced the effects of introduced technologies, changing colonial administrations, and in-migration. Customary rules of behavior were modified to adjust to these influences. Custom is fluid and adaptable to changing circumstances. Throughout this period of adaptation, however, certain underlying values remained unchanged. Values such as respect for traditional leaders, consensus-based dispute resolution, and significance of clan membership, have survived the impact of colonialism and modernization, and form a significant part of the identity of island peoples.

Judges must recognize the fluid and complex nature of custom. Different ethnic groups within one region may adhere to different custom. Problems of language and untranslatable concepts overlay the problem of discovering custom. Religious beliefs, clan membership, oral history traditions, day-to-day practices can coalesce to create an ambience of custom that defies explicit definition, particularly in English. For this reason, judges should be open to testimony from a variety of non-written sources, should be willing to use feeling and intuition, and should attempt to write opinions in native languages.

These suggestions will disturb the western-trained lawyer, in that they invite imprecision into a system of law that values precision. The western insistence upon precision, however, tends to denigrate custom. Custom by definition is unrecorded, internalized, and integrated with culture. If precision is valued, the written statute or case will always defeat custom. If preservation of custom is the goal, judges must reach beyond the lawyer-like demand for precision, and experience the cultural milieu of custom.

The search for analogies in Anglo-American experience may well prove fruitless. As one judge noted in a Marshallese property dispute:

> ... there is no analogy between the common American idea of an absolute owner and the Marshallese idea of the holder of any one of the levels of rights in the Marshalls.

The concept of property and natural resource ownership is dramatically different in emerging Pacific nations. Ownership is frequently communal, and characterized by layers of use rights rather than fee-simple ownership. Access to reefs, landing areas, surface waters, and fishing grounds may each follow different sets of customary rules. Judges must recognize that in island communities where access to resources is part of the livelihood of the people, complex systems of use have evolved that are adverse to western concepts of ownership.

In resolving disputes over resource use, access, and ownership, the courts may wish to develop a doctrine of abstention to traditional dispute resolution mechanisms. In western law, the doctrines of abstention and exhaustion uphold the idea that judicial resolution is appropriate only after other appropriate means of resolving the issue have failed. In a Pacific island context, this could mean that courts should not resolve a dispute over natural resource use until traditional leaders are consulted and customary methods of dispute resolution are exhausted. Encouraging citizens to rush to the courthouse with such disputes will be destructive of the consensus-based systems that have effectively maintained peace and allocated resources in the past.

Appellate courts should defer to findings of custom made by trial judges who are familiar with a community. The Supreme Court of Palau in Skebong v. Trust Territory, overturned a finding of custom made by a trial judge who was born and raised in Palau on the ground that the judge did not take specific evidence on the issue of custom. While it is wise for trial court's to build a record supporting a finding of custom, appellate court's should not lightly overturn a local judge's finding of custom. The standard of review applied to findings of fact is appropriate here: an appellate court should not set aside a native trial judge's finding of custom unless it is clearly erroneous.

The historical record shows that without the acceptance of customary values as primary guiding principles, customary practices will die. Judges are particularly important guardians of custom because they are insulated from some of the economic, political, and social pressures bent upon the destruction of culture. As the Hawaii experience shows, legal rules will be used against islanders unfamiliar with legal concepts in order to deprive them of traditonal access and ownership of natural resources and land. Legislators, subject to economic influence, may be unable to prevent such misuse of law. Disputes over access rights and land ownership will thus fall to the courts, and if the courts use custom as a guiding principle, they can avoid the destruction of traditional values.

CONCLUSION

Traditional renewable resource practices have succeeded in the Pacific and are tied to a culture and a way of life precious to island peoples. History shows that the importation of Anglo-American law can destroy custom. The challenge to judges, lawyers, and leaders of the emerging Pacific nations is to integrate custom and the rule of law in a way that will preserve a unique island way of life. This paper offers a few tentative suggestions for techniques that will recognize and preserve custom. Whether or not these specific ideas are adopted, it is hoped that Pacific-island leaders will recognize the need to take affirmative steps to preserve the legacy of their past.

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END NOTES

1. Levy, "Native Hawaiian Land Rights," 63 Calif. L. Rev. 848, 848-853 (1975).

2. Id. at 853-858. See also, Daws, G., Shoal of Time 124-128 (1974).

3. Levy, "Native Hawaiian Land Rights," 63 Calif. L. Rev. 848, 856 (1975).

4. Levy in his article states as follows: "While these suggestions explain the number of commoner families receiving grants, the more cogent reason why commoners received so little *kuleana* land is that kuleana grants were limited by the 'really cultivated' clause of the Kuleana Act. Furthermore, an act of the legislature barred all commoners' claims not proved by 1854." Id. at 856. The "really cultivated" clause of the Kuleana Act allowed each tenant to apply for land which a tenant had "really cultivated" plus an additional houselot of not more than a quarter of an acre. Id. at 855.

5. The congressional enactment of the Hawaiian Homes Commission Act created a homesteading program for Hawaiians. In general Native Hawaiians have not been satisfied with the administration of this program. See Native Hawaiians Study Commission, Volume II Claims of Conscience: A Dissenting Study of the Culture, Needs, and Concerns of Native Hawaiians Submitted to the U.S. Congress, Pursuant to Section 203, of Public Law 96-565 "Title III" establishing the Native Hawaiians Study Commission.

6. The Act was titled "Enactment of Further Principles, enacted by the Hawaiian Government on August 6, 1850, Laws 1850, p. 202.

7. The statute was also cited in McBryde Sugar Co. v. Robinson, 54 Hawaii 174, 191-192 (1973), as the basis for declaring that the riparian system of water rights is in effect in Hawaii.

8. Oni v. Meek, 2 Hawaii 87, 90 (1858).

9. Id. at 93.

10. Kalipi v. Hawaiian Trust Co., Ltd., 66 Hawaii 1 (1982).

11. Id. at 2.

12. See generally, Van Dyke, Chang, et al., "Water Rights in Hawaii," in *Land and Water Resource Management in Hawaii* (1977); Chang, "Unravelling *Robinson v. Ariyoshi*: Can Courts 'Take' Property?," 2 *U. Hawaii L. Rev.* 57 (1979) and Chang, "Missing the Boat: The Ninth Circuit, Hawaiian Water Rights and the Constitutionality of Retroactive Overruling," 16 *Golden Gate* 123 (1986).

13. Van Dyke,Chang, et al., "Water Rights in Hawaii," in *Land and Water Resource Management in Hawaii* 152 (1977).

14. Reppun v. Board of Water Supply, 65 Hawaii 531, 541 (1982).

15. The U.S. Supreme Court recently vacated the Ninth Circuit opinion in Robinson v. Ariyoshi, 753 F.2d 1468 (9th Cir. 1985), *petition for cert. filed*, 54 U.S.L.W. 3279 (U.S. Sept. 10, 1985)(85-406), which affirmed a lower court injunction against the enforcement of the Hawaii Supreme Court decision in McBryde Sugar Co. v. Robinson, 54 Hawaii 174 (1973), a decision where the state's power to control surface water was reaffirmed.

16. See "Report of the Advisory Study Commission on Water Resources to the Thirtieth Legislature State of Hawaii," January 14, 1985. In 1982 the state legislature created the Advisory Study Commission on Water Resources. The Commission was charged with reviewing the relevant issues and formulating a water code for the state. The code that was drafted allowed for the creation of permits of an unlimited duration, allowing, in essence, the resurrection of a system of private ownership of water which existed prior to the "public trust" decision in McBryde Sugar Co. v. Robinson, 54 Hawaii 174 (1973). See generally, Chang, "Water Rights in an Age of Anxiety," 77 J. Am. Water Works Assoc. 40, 43 (1985).

17. Palama v. Sheehan, 50 Hawaii 298 (1968).

18. County of Hawaii v. Sotomura, 55 Hawaii 176 (1973).

19. Liebowitz, "American Samoa: The Decline of a Culture," 10 Cal. Western Int'l L. J. 220 (1980).

20. *Id*. at 271.

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22.

23. See generally, Lutz, " Micronesia as a Strategic Colony: The Impact of U.S. Policy on Micronesian Health and Culture" (1984).

Background Paper No. 9

SUITABILITY OF COOPERATIVE ENTERPRISES FOR THE PRODUCTION OF FOOD ON THE TERRITORIAL ISLANDS OF THE UNITED STATES

by

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ABSTRACT

The territorial islands all import substantial portions of their food needs. Reducing imports by only 10 percent to 20 percent and replacing that with local produce would increase the employment base by several percent and could reduce food prices and improve island diets. In Puerto Rico there is some tradition of market-oriented agriculture, but government policy is more encouraging to industrialization and urbanization. There is little modern, competitive agriculture in the Pacific under the control of indigenous populations. Exceptions occur with the help of cooperative enterprises--businesses owned by member-investors who have a direct need for the product or service supplied. A producer co-op provides some economic benefit to individuals as they earn a livelihood. A consumer co-op helps individuals obtain products not otherwise available on acceptable terms.

The purpose of this paper is to explore the prospects for increasing food production through cooperative enterprises. Five such enterprises are analyzed: two which show significant prospects for increasing agricultural production on Saipan and Puerto Rico; two fishery co-ops that failed; and an incipient program on Palau. Conclusions are drawn about the best approach to co-op development on the islands. In this approach, local governments bear primary responsibility for encouraging increases in agricultural production (as they encourage tourism, industry and urbanization). Congress can provide modest financial support as well as technical assistance in production and marketing through cooperatives.

INTRODUCTION AND BACKGROUND

A cooperative enterprise is a business owned by member-investors who have a direct need for the product or service supplied. The return on a cooperative shareholder's investment may be in the form of actual cash payments (patronage rebates) or discounts on future purchases. (By contrast, investors in a capital enterprise are not necessarily interested in the product or service, just in the financial return on equity shares held).

This paper assesses the usefulness of co-ops as a way of encouraging food production on the U.S. territorial islands, all of which must import half or more of all food consumed. Co-ops are already known to be a useful way of organizing and mobilizing capital and people in developing communities, and to represent investments that benefit community members.[1] Thus, while small farmers face real difficulties purchasing small quantities of supplies competitively, and obtaining capital for equipment, cooperative associations of farmers can competitively purchase supplies, services and equipment and market produce for the benefit of the entire group.

The distribution of profits may be less important to members than the benefits of more efficient marketing and production. Such benefits can amount to real cost savings.

Each cooperative member typically has one vote in selecting the Board of Directors and in establishing operating policy, regardless of the number of shares held. This contrasts with capital enterprises whose biggest shareholders also have the most votes. Cooperatives generally encourage unlimited membership, although the population eligible may be specified (i.e. a farmer's cooperative may limit membership to farmers). Some cooperatives limit the use of the product or service to members; others allow open usage but distribute profits only to members.

There are advantages and disadvantages to cooperatives (relative to capital enterprises). One major advantage is the built-in incentive for members to use the service. Increased usage by members increases the revenues of the cooperative and profits are distributed according to usage. One major disadvantage is the lack of incentive for members to purchase more than one share, limiting the cooperative's available capital. To raise significant amounts of equity, the cooperative must attract new members, not hope for a few large investors. If membership recruitment is successful, this disadvantage can become an advantage. To raise capital, some cooperatives require members to purchase additional shares as individual usage increases. Some require members to contribute labor as well as capital, although it often proves difficult to operate an efficient business with contributed, part-time labor.

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[1] Abrahamson, Cooperative Business Enterprise, pp. 2-15.

Cooperative enterprises function best when members have limited alternate options for earning income or obtaining products. They are well-suited for developing communities where individual producers have limited access to markets, pay higher prices for materials, supplies or finished products, and possibly lack access to some needed goods or services. Where higher-priced imports can be replaced with locally-produced items, moreover, both the local producer and the community at large benefits.

The territorial islands import substantial amounts of food. Puerto Rico imported $1.07 billion in food and live animals in 1977.[2] In 1979, the Northern Marianas imported $11 million in food representing 35 percent of all imports.[3] The Trust Territories (Marshalls, Palau, Ponape, Truk, Yap and Kosrae) imported $20.2 million in food and beverages in 1977, 45 percent of total imports.[4] To reduce these figures, local products must undercut the cost of imports. Local production and marketing would have the comparative advantage of moderate transportation costs, lower rates of spoilage, and product freshness.

FORMS OF COOPERATIVE ENTERPRISES

There are two principal types of cooperatives: producer cooperatives and consumer cooperatives.[5] Producer co-ops offer members some advantage in the way they earn their livelihood. Farmers who associate to market products and purchase supplies form a producer co-op. Consumer co-ops give members access to a product or service that is otherwise difficult to obtain.

There are four types of cooperatives that represent variations of the two principle types:

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[2] Economic Study of Puerto Rico, 1979, p. 105

[3] Overall Economic Development Strategy, Commonwealth of the Northern Mariana Islands, 1980, p. 54.

[4] The Far East and Australasia, 1984-85, p. 724.

[5] Abrahamson, Cooperative Business Enterprise.

(1) Housing cooperatives. Each member-resident owns a proportionate share of all buildings instead of a whole single unit.

(2) Worker-owned companies. Employee-owners are paid a salary, democratically elect management, and share in the profits through a mutually agreeable formula.

(3) Shared-service cooperatives. Members are businesses which join together to purchase certain types of services for mutual benefit.

(4) Financial cooperatives. These are institutions like credit unions, certain types of mutual funds, and certain mutual savings banks, which pool the savings of members and make them available for the members' credit or investment needs.

This paper does not address housing cooperatives and deals only briefly with worker-owned companies. Shared-service and financial cooperatives are considered as examples or as components of some producer and consumer cooperatives.

PRODUCER COOPERATIVES

There are a great variety of producer cooperatives. Some are limited in purpose and members conduct most of their business outside the cooperative. Thus, producers may only periodically pool their resources to purchase bulk quantities of certain supplies at a discount; they cooperate in no other way. Such associations are usually loosely organized and require only limited capital.

Farmers who produce multiple crops may associate to market only one crop, and independently market the others. Crops that require expensive processing (dairy products, fruit and grain) are often best marketed cooperatively. The cooperative would establish a processing plant and charge each member a fee to cover the cost of operation. If the plant generates a profit, rebates can be given in proportion to the amounts of products a member processes.

If the plant fails to earn a profit or even cover costs, members may increase the user fee, make additional capital contributions, or reduce costs. The same options would apply to a capital enterprise. Some argue that there is not enough profit motivation in a cooperative organization to assure sufficient earnings for future growth. This may be the case, particularly in more complex organizations involving extensive capital investment, but there are ways to avoid this pitfall, as will be shown below.

The more highly organized cooperatives provide fully integrated programs for their members. Such cooperatives may arrange bulk purchases of supplies, lease planting and harvesting equipment to individual members, process and market the finished product, provide financing for members, and even conduct research and development in new crops or new techniques. The more functions the cooperative undertakes, the more complex the operation becomes.

In another variation of producer cooperative, groups of farmers, recognizing that there are certain economies of scale in large farms, may purchase a sizeable tract of land and work it together. The cooperative may either subdivide the land and give each member responsibility for and benefit from one parcel; or share in the production of the entire tract and distribute the proceeds according to some acceptable formula. Such cooperatives almost always include arrangements for marketing, processing or financing, and for such infrastructural needs as irrigation, flood control and transportation.

A more decentralized form of cooperative may be better for livestock husbandry. Breeding and hatching require considerable technical skill. In a cooperative breeding facility, growers could raise young animals to maturity and then sell them back to the cooperative or on the open market.

CONSUMER COOPERATIVES

A consumer cooperative gives members access to a particular type of product or service. In its simplest form, it is a buying club. Periodically a group of consumers will pool their resources and buy certain products in bulk at a discount, sharing the discount among themselves. These small, loosely organized buying clubs require little capital investment and have limited objectives.

The most common form of consumer cooperative is the cooperative retail store. Members purchase shares to raise capital for inventory and for a sales facility. Some retail cooperatives only allow usage by members; others have open patronage. The return on the member's investment is almost always of secondary importance; the desire for a particular type or quality of product is paramount. Typically, members strongly influence the selection of products for the store, and they may contribute labor.

Some consumer cooperatives provide a service rather than a tangible product. Member cooperative labor is crucial to child care, a fast-growing service. Cooperative health care, specifically in the Health Maintenance Organization format, is well-established in many markets.

A shared-service cooperative is a form of consumer cooperative with businesses as members. Businesses are consumers of space, supplies and other services. Through a cooperative, several may share a common facility and purchase supplies and services together.

In order to compete with chain supermarkets, many independent stores in metropolitan areas have formed wholesale supply cooperatives for purchasing, advertising, and other support that large chains provide their stores. These are both forms of shared-service cooperatives.

Financial cooperatives may be considered a form of consumer cooperative in which members receive higher returns on savings or have access to credit on more attractive terms than alternative institutions offer. Members are essentially consumers of financial services. Mutual funds (serving savers) try to maximize the return to savers. Credit unions are more borrower-oriented and try to minimize the cost of credit.

A COMBINATION PRODUCER/CONSUMER COOPERATIVE

A combination producer/consumer cooperative, or joint venture between independent producer and consumer cooperatives, could facilitate production and distribution of farm products. In joint ventures, the formula for distributing net proceeds would have to accommodate the economic intersts of both groups.

SUMMARY: ADVANTAGES AND DISADVANTAGES OF COOPERATIVES

Cooperative forms of business organization can stimulate economic development in several ways. They provide a means of organizing individuals with similar economic interests to find mutually beneficial solutions to local economic problems. Such problems can be transformed to business opportunities through pooling of capital.

In capital-poor communities, a cooperative offers a means of mobilizing small amounts of capital from many individuals and concentrating that capital on a single project of broad community importance. Capital corporations would not undertake such projects unless the potential profit exceeded that available on alternative investments.

When successful, the cooperative enhances the interests of the individual members and those of the community at large. This is true for the capital corporation when markets are competitive and active, but may not be true when there are market barriers or constraints.

The cooperative offers an alternative when conventional capital corporations are unable or unwilling to enter markets because of inadequate return, high risk, or lack of capital.

However, there are some disadvantages to cooperative organizations from a business standpoint. Members with diverse interests strongly influence business policy and management. This can result in short-sighted decisions that are detrimental to the cooperative in the long run. For example, if members of a producer cooperative demand higher prices than the retail market can support, they may profit initially, but the organization will ultimately fail. Cooperatives also have more problems raising large amounts of capital than capital corporations, and many rely in debt financing. Excessive debt loads make any business vulnerable.

Finally, cooperatives tend to engage in non-business activities such as member education, community organizing and political action for social change, diverting attention from normal operations. When capital corporations engage in such activities, they are usually related to product marketing, i.e. to normal business operation.

SELECTED CASES OF COOPERATIVE ENTERPRISES IN INSULAR TERRITORIES

This section analyzes selected food production cooperatives in insular communities. The examples chosen cover a sufficiently broad set of alternatives that certain generalizations can be made.

THE SAIPAN FARMER'S COOPERATIVE ASSOCIATION (SFCA)

SFCA is a producer cooperative of 85 farmers. While the Revenue Department has ruled that SFCA is no different than any other retail business, and is subject to a 1 percent gross receipts tax (from which individual producers are exempt), legislation is now pending to exempt SFCA from this tax. SFCA's principal activity is the retail sale of the members' produce; secondary activity is the procurement of supplies and animal feed for sale to the farmers. The cooperative, chartered in 1972, was practically bankrupt by 1980. Since new management took over in 1982, it has been far more successful. Sales have increased from $133,000 in 1982 to $575,000 in 1984. Retail sales represent 59 percent of all sales, animal feeds 34 percent, and supplies sold to members 7 percent.

The membership fee is $1.00; shares are $5.00. The cooperative has little capital but has obtained a $10,000 line of credit, which allows it to make cash payments to members for their products. SFCA does not guarantee its members a fixed price, or purchase products which do not meet a market standard, but it has been able to purchase most of what its members produce.

The cooperative rents a building for its retail store, warehouse and offices. Most of the products sold are fresh fruits and vegetables, along with some locally-processed and baked goods, eggs and honey. No meats or fish are sold. A major problem in earlier years was spoilage, but with more attentive management and a higher volume of sales, this has been greatly reduced.

Some farmers in Saipan produce traditional products using traditional methods; others use more modern techniques. Many traditional farmers are part-time farmers, but the more modern group takes a more commercial approach to farming. One group of 14 farmers rents commercial plots on a 56-acre government-owned tract. The government plays no direct role in the management of the farming operation.

While SFCA sales have increased significantly over the past three years, they still represent only a small fraction of the market potential. In 1979, the Northern Marianas imported $11 million in food items, representing 35 percent of all imports.[6] With inflation and the expanded tourism industry, this probably approaches $15 million today. Local farmers are unable to serve the tourism sector in any significant way. Japanese interests control this industry and have set up a number of barriers to access by local suppliers. Since tourism represents a significant and growing source of revenue for the island, local government officials are reluctant to press hotel operators to modify their practices. SFCA is also limited by the fact that it has only one retail location. To serve more of Saipan's dispersed population, SFCA will at some point need additional outlets.

Only about five percent of the land in the Northern Marianas is suitable for agriculture, and much of that requires irrigation. Public resources directed at the preparation of farmland have been very limited, and there is not enough private capital for this. Nevertheless, SFCA is demonstrating that, with competent management, a modest amount of public and private capital, and a committee group of participating members, small-scale agricultural cooperatives can have a measurable impact on local food supply.

FEDERACION PARA EL DESARROLLO AGRICOLA DE PUERTO RICO (FEDA)

FEDA is a complex federation of over 20 producer associations in Puerto Rico[7] which operates a tropical fruit juice processing and marketing plant and provides financial and technical assistance to member-farmers who supply fruit to the plant. About 600 farmers are regular participants in the program; another 600 participate intermittently. Most own or lease land as individuals, but market certain cash crops with the assistance of the local cooperatives. Typically a farmer will produce a combination of cash crops

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[6] Overall Economic Development Strategy, 1980, p. 54.

[7] The material for this section was taken from various materials prepared by FEDA including a Business Plan (1981), application for financing submitted to the National Rural Development and Finance Corporation (1982), periodic reports issued by FEDA, and an application for grant support submitted to the Ford Foundation (1985).

(coffee, bananas, tobacco, passion fruit, etc.) as well as subsistence crops on a total of about five to ten acres.

The primary product of the federation plant is passion fruit juice, but seven fruits are processed. FEDA raises rabbits and pigs for sale as food, using the waste from the juice plant for animal feed.

FEDA farmers and plant employees elect directors who set the federation's operating policy. FEDA has spawned a non-profit institute which conducts botanical research to improve productivity and trains farmers to grow tropical fruits. It also manages a revolving loan fund which finances the planting costs for its members.

FEDA enjoyed considerable success in its early development years, but with an enormous debt load that requires over $100,000 per year to service, and high overhead costs, it is not yet financially self-sustaining. FEDA's obligation to purchase the product that it has induced farmers to grow places a tremendous demand on its financial resources. (It now purchases over four million pounds of fruit annually from its members at an average price of 10 to 20 cents per pound). Without FEDA, the farmers would have little chance of marketing the product and can use only small amounts of it themselves. Member farmers who set policy through their elected directors tend to set the price they receive above the market price, further taxing FEDA resources.

Currently, FEDA has more than $400,000 invested in inventory and another $700,000 loaned to members for planting. (It can cost up to $2,500 per acre to plant passion fruit.) It has obtained over $4 million in capital, including $1.8 million in a federal Economic Development Administration grant for plant construction and over $2 million in federal and private loans.

To assure financial success and to fully utilize the plant, new off-island markets for fruit juice must be developed. U.S. distributors such as Tropicana or Ocean Spray require enormous quantities of product, more than FEDA can now provide. FEDA is, however, attempting to market to local distributors in South Florida and New York where there are large Caribbean populations. European distribution initially seemed promising, but the strong dollar has made FEDA less competitive in this market. Ultimate success will depend on the ability to market at least 10 million pounds of fruit annually.

In summary, FEDA has succeeded in developing all of the elements of a fully-integrated agribusiness program, including a modern processing plant, a network of farmer-suppliers, new techniques to raise productivity, a mechanism to finance plantings, and a functional organizational and management structure.

The cooperative structure is ideal for passion fruit and similar crops that require intensive cultivation and grow best in small plots. It would be far more difficult for a private company to induce individual farmers to undertake such high-risk, high-cost planting. The average member earns approximately $4,000 per year farming, and through FEDA can increase the farm's income by 50 percent or more. Clearly, success for FEDA can bring measurable financial benefits to 600 families.

While the FEDA effort has been admirable, it may be that greater individual returns could have been realized by concentrating on locally used foods rather than specialty export products. In 1977, Puerto Rico imported $133 million in fruits and vegetables, and $1.075 billion in food and live animals. If local markets could replace one percent of this, it would translate to an increase of over $21 million in local production.

VIRGIN ISLANDS FISHERY COOPERATIVES

Between 1975 and 1978, the Farmer Cooperative Service of the United States Department of Agriculture (USDA) partially financed two fishery cooperatives, one in St. Thomas with 44 fishermen and one in St. Croix with 51 fishermen.[8] Both appear to have been well-planned technically, but for reasons not altogether clear, both failed.

The cooperatives were formed to provide a more organized and sanitary method of selling catch and to assist members in purchasing supplies such as fuel and ice. Most of those who joined were part-time fishermen who had been selling their catch on street corners. Spoilage and fish poisoning were common.

Each proposal called for the construction of a waterfront facility to serve as a supply point for members and a receiving point for the fish. Each facility would include a cooler, freezer, ice machine, fuel pumps, cleaning areas, and a retail sales area. The co-op would also sell fish to hotels and restaurants.

The total cost of the St. Thomas facility was estimated at $211,300; members would contribute $17,500 in equity. The cost of the St. Croix facility was put at $184,925; members would contribute $20,000. The projects were financed with a combination of USDA and private loans.

No systematic evaluation has ever been conducted to determine the exact reasons for failure, but there were at least four major contributing factors:

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[8] The material for this section was taken from USDA Farmer Cooperative Service Report 152, St. Thomas-St. John Fishermen's Cooperative (1977), FSC Preliminary Report 11, Feasibility of Organizing a Fishery Marketing Cooperative (1975), and material provided by Mr. Edward Towle of the Island Resources Foundation

(1) Members were required to sell the catch to the co-op at a price *substantially below the street market price*, and the volume available for sale was consistently below projections.

(2) Overfishing and theft and damage to the fishermen's traps substantially reduced the catch. The government was apparently lax in its response to theft; damage was caused by cruise ships inadvertently cutting the lines.

(3) Both operations were substantially in debt as a result of their financing structures, as well as expensive overheads and operating costs. (Excluding supply and fish purchases, these were projected to be $145,000 per year at St. Thomas.) Shortly after both facilities began operation, fuel prices and inflation soared.

(4) The fishermen's associations never became strong cohesive organizations and had difficulty setting operating policy, maintaining market discipline, and selecting competent management.

PRODUCTION AND MARKETING OF FRUITS AND VEGETABLES IN KUROR, PALAU

Over half of Palau's 14,000 residents live in Kuror.[9] Though small and rural by mainland standards, this community is sufficiently urbanized that the traditional Palauan diet of fish, rice and vegetables has been largely replaced with imported canned meats. To the extent that supply is available, consumers prefer fresh local produce, but interest in producing food has been replaced in Kuror by a desire for "white collar" employment, often with the government.

Residents of some outlying communities do recognize the market potential of island crops and have begun to grow a variety of fruits and vegetables. Climate and soil are apparently suited to this production, which has increased steadily since 1977. (The El Nino drought of 1983 was, however, severely disruptive, and abundant insects and rodents must be controlled chemically.)

The primary factor limiting further growth in local food production appears to be problems of distribution. Transportation is poor outside of Kuror. Bad roads, hot weather, lack of refrigeration during shipment, rats, and handling all take their toll. Farmers avoid more delicate crops such as tamatoes in favor of bananas, coconuts, pineapple, taro, bilum, eggplant, and watermelon.

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[9] The material for this section was taken from three unpublished manuscripts prepared by Dr. Mary McCutcheon, an anthropologist with the Smithsonian Institution. Two of the papers, "Fresh Fruits and Vegetables in Kuror, Palau" and "Musing Clubs in Palau" were presented in meetings of the Association of Social Anthropologists in Oceania (March 1985). The third is a portion of a PhD dissertation entitled Resource Exploitation and the Tenure of Land and Sea in Palau (1981).

All farming is done on individual plots, but out of necessity and for mutual benefit, some rudimentary cooperative associations have formed. One group of Melekeok farmers shares the cost of shipping produce from their island to Kuror. Two small retail outlets have developed to market the produce of certain suppliers on a cooperative-like basis. Although no formal producer or consumer cooperative has yet developed, there is potential for such development. Rural producers are apparently willing to supply fruits and vegetables to the "urban" market. Their ability to do so could be greatly enhanced through certain types of capital investment which no single producer could undertake, and by assistance with crop selection, transportation, and either wholesale or retail marketing. A cooperative that performed these functions for producers could benefit the whole economy. With some assistance, Palau could develop a cooperative similar to the Saipan Farmers Cooperative Association.

FACTORS THAT HAMPER OR SUPPORT ISLAND COOPERATIVES

The histories of the Caribbean and Pacific islands differ in one important way that makes the two regions difficult to compare. When the Caribbean islands were colonized by Europeans in the sixteenth century, most of the indigenous population was killed and replaced by Europeans and African slaves. These islands functioned as profitable plantation colonies for over 300 years, passing to U.S. control less than 100 years ago. The Pacific islands, while technically under the dominion of European powers, remained essentially untouched until they became whaling stations in the late nineteenth century, and native populations were also nearly destroyed. The Japanese assumed control of many of the islands after World War I. They established agricultural colonies but ran these colonies with Japanese workers. During World War II, fierce battles were waged on many of the islands, destroying much of the population as well as the productive capacity of the islands. During the first 20 years of U.S. trusteeship, little effort was made to introduce productive enterprise to the islands. In the last 20 years, local agricultural production has developed to only a modest degree in the Pacific.

The Pacific islands, therefore, have almost no tradition of modern organized agricultural production enterprises such as developed on the Caribbean islands, and no tradition of enterprises managed by indigenous populations.

Lack of capital-oriented food producers, limited land area, and competitive demands for investment capital continue to constrain the production of food on the Pacific islands, despite both a large unserved local demand and high costs of imported food items. Most food and finished goods consumed there are still imported. Subsistence fishing along the reefs of the smaller islands is common, but few islanders own the types of vessels needed to fish for larger commercial varieties. Much of the fishing in Puerto Rico and the Virgin Islands is also subsistence level; only small amounts of the local catch are sold.

Although there is a tradition of local agricultural production on a commercial basis in Puerto Rico, government policy encourages technology-oriented urbanization and welfare programs while ignoring or discouraging production of food for the local market. Only production of export crops such as sugar, coffee and tobacco has been encouraged, and agricultural production has declined precipitously.

None of the insular communities in either region exhibits what could be considered a strong tradition of cooperative enterprise, and although the government of Puerto Rico has established financing and technical assistance programs to encourage the development of cooperatives, the emphasis has been in housing development and retailing. Several thousand units of multi-family housing have been constructed, and a chain of cooperative supermarkets operates in a few of the larger cities. Despite attempts for at least three years, FEDA was unable to obtain local financing. At the same time, it managed to secure almost $3 million off-island. Only after FEDA obtained considerable mainland attention was it able to obtain local support.

There apparently is no local government agency or private organization on any of the other territorial islands actively encouraging the development of cooperatives.

Nonetheless, the cooperative structure seems, in some cases, to be encouraging increased agricultural production. Cooperatives offer individuals interested in market farming a means of obtaining capital for production and greater access to markets. Even though local production continues to decline in Puerto Rico, there is still a sufficient base on which to build a future farm economy.

Despite the lack of a tradition of market agricultural production under local management in the Pacific, cooperative structures are beginning to successfully encourage agricultural production. A culture built on extended family networks and shared ownership of means of production is ideal for cooperative organizations.

APPROPRIATE ACTIONS AND LIKELY OUTCOMES

Food imports impact island populations in many ways:

(1) Imported food is expensive and often poor quality. This produces a lower standard of living on the island.

(2) Employment opportunities and tax revenues dependent on local production are lost.

(3) The multiplier effect of respending is greatly reduced by leakages from the system.

On Saipan, the $11 million cost of imported food in 1977 exceeded the estimated gain from tourism ($9.8 million). The wages earned by local hotel and restaurant employees amounted to only $1,258,000.[10] Certainly a better balance between agriculture and tourism would be beneficial to the economy as a whole. In Puerto Rico, import effects are even more devastating.

Rural populations are declining, and support for urbanization continues. The magnitude of the loss to importation underscores the magnitude of the market opportunity. No production sector offers more market opportunity or ease of entry than agricultural production for the local market. Capital requirements are modest relative to industrialization, tourism or urbanization. However, no single farmer can organize the type of distribution system necessary for proper marketing of produce, particularly while the distribution system is oriented to imports. The cooperative structure represents the best approach.

Every location is different, and this approach must be tailored to local circumstances. Nevertheless, experience provides some general lessons:

(1) The effort should concentrate on crops for which there is a local demand now met by imports.

(2) Capital-intensive efforts should be avoided, particularly if the capital is borrowed at high interest rates. Modern techniques of irrigation and mechanization can and must be used to establish a competitive market position. Crop farming and certain types of animal husbandry are probably more desirable than fisheries projects, given the size of the investment a fisherman must make to operate commercially.

(3) It may be necessary for the local government to invest in some infrastructure.

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[10] Overall Economic Development Strategy, 1980, pp. 17, 21a and 54.

It will be a long and difficult process to get the island economies to a point where they can contribute a measurable amount to local food production. However, it is absolutely essential that they offset the economic drain of imports.

RESPONSIBILITY OF LOCAL GOVERNMENT

Primary responsibility must lie with the local government. Support should come in three forms: actions which guide the overall direction of agricultural development; actions which influence marketing and supply; and direct financial subsidy. Local government must put agriculture on an equal footing with industrialization, urbanization and tourism, and provide it the same guidance, financial and infrastucture support, tax benefits and technical assistance it does for those sectors. Guaranteed contracts for the purchase of locally-produced items by schools, welfare and social service programs will provide market stability. In Saipan and other tourism centers, local government should strongly encourage the tourism industry to purchase local produce. On Saipan, the government has prepared a 56-acre plot of land for lease to local farmers. This action has contributed to the success of the Saipan Area Farmers Cooperative. Continuation and expansion of such actions will bring the local economy sizeable benefits.

OUTSIDE SUPPORT

The U.S. Congress can also provide funding to support or encourage such activities. This need not be a large commitment, but it should be made for a sufficient period of time to show results. Just $2 million per year in development capital and technical assistance, carefully applied to achieve the maximum benefit, could double or triple local agricultural production in the Pacific islands within three years. Possibly $5 million per year would be needed for Puerto Rico because of its larger size and population.

The National Cooperative Bank (NCB) should be part of any cooperative development activity in the insular territories. Chartered by Congress in 1978, NCB provides financing and development assistance for cooperative businesses and housing. A non-profit subsidiary, the Consumer Cooperative Development Corporation (CCDC) has the specific mission of assisting low-income development cooperatives. As of March 31, 1985, NCB had almost $80 million available for lending, and CCDC had approximately $27 million.

NCB has a regional office network. Puerto Rico and the Virgin Islands are covered through the Washington, D.C. office. There is no active program for the Pacific islands. However, there are offices in Oakland, California and Anchorage, Alaska which could serve the Pacific islands.

The lending policies currently in effect emphasize the financing needs of established cooperatives. CCDC will provide "advances" to promising organizations to develop business plans or marketing programs, but not of a magnitude required for an ongoing program. CCDC could provide term financing for projects like the Saipan Farmers Association or FEDA. CCDC and NCB should be considered a source of longer term financing, but not a primary source of start-up or development capital.

The National Cooperative Business Association (NCBA), formerly known as the Cooperative League of the USA (CLUSA), is a trade association for cooperatives.[11] Its primary mission is to provide education and information-sharing to the cooperative business sector through various publications, conferences, seminars, and direct technical assistance. NCBA has provided technical assistance to development cooperatives in more than 40 countries under contracts with host governments as well as the World Bank, USAID, the UN Development Program, and the Ford Foundation. NCBA maintains project offices in India, Indonesia, Haiti, and several African countries.

A COOPERATIVE DEVELOPMENT PROGRAM MODEL

An effective program would draw on the best aspects of the Saipan and FEDA models. The program should center on individual farmers producing crops for local consumption, as in Saipan, but provide FEDA's more comprehensive set of services. Everywhere but in Puerto Rico, a single cooperative should be able to serve the entire farming population. In Puerto Rico, a series of more localized cooperatives, probably at the Municipio level (a unit of government roughly equivalent to a county), will be needed. Each cooperative should be provided with a production and a marketing specialist. The production specialist would assist farmers with planting techniques, land preparation, use of fertilizer and pesticides, irrigation, storage, and transportation. The marketing specialist would assist with local marketing strategies, and advise on whether to retail through co-op owned stores, wholesale through brokers and distributors, or sell to hotels and other institutional buyers.

The farmers must have access to financing, both at the farm and the market levels. The greatest financing need at the farm level will be for land preparation and for production, storage and transport equipment, some of which could be owned by the cooperative and shared. Local governments may find it helpful to prepare a large tract of land and rent parcels to individual farmers (as in Saipan). In locations where roads are poor, the government may need to invest in road improvements.

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[11] For further information, contact National Cooperative Business Association, 1828 L Street, N.W., Suite 1100, Washington, D.C. 20009.

The cooperative may need one or more retail outlets with refrigeration equipment and preparation facilities. Refrigerated trucks to take produce from the farms to market would reduce spoilage significantly.

The Saipan Farmers Cooperative Association now sells almost $600,000 in produce annually, a fraction of its potential. The only significant public investment in this program is the preparation of farmland for lease. With nurturing, SFCA could become a model for agricultural development throughout the Pacific islands. Ideally it would have a budget of up to $50,000 per year for technical assistance and an investment fund of $250,000 to $500,000. A portion of the investment capital could be used for land or other infrastructure preparation through the local government, a portion for cooperatively-owned marketing facilities and equipment, and a portion for loans to individual farmers. The program should not be wholly grant-supported; it must be a revenue generating business. An attainable objective would be to bring 20 additional farmers into production, adding at least $1 million in annual sales locally.

LIKELY ADVERSE AND BENEFICIAL CONSEQUENCES

Few, if any, adverse consequences are likely to result from increasing agricultural production on the territorial islands. Excessive use of pesticides and other chemicals can, however, result in environmental damage, as can improper clearing and cultivating of land. Small islands can be particularly vulnerable to erosion and soil damage. Nevertheless, rudimentary precautions can eliminate most such danger.

When traditional modes of production change, social change may also result. It is difficult to predict exactly how new and more modern ways of producing income might affect family life in the more traditional communities of the Caribbean and Pacific islands.

Substantial economic benefits could result from a significant increase in local food production on the islands. In 1978, the average wage of a private employee in Saipan was $2,834. Over 75 percent of all workers earned under $5,000. The CMNI Division of Finance reported a total of 7,317 paid workers earned a total of $28,710,000. At that same time, food imports totaled $11,008,000. Imports were thus equal to the wages of 53 percent of the population. The average farmer should be able to retain (after expenses) approximately 30 percent of the retail value of the crop. Therefore, sales of

$10,000 at retail would represent approximately $3,000 in net earnings for a farmer. An increase in local production of $1 million (9 percent of imports) would create employment for approximately 100 farmers, or 1.4 percent of the workforce.[12] Secondary employment would result from the distribution and sale of the products.

The population at large would also benefit. Fresh local produce would, in all likelihood, be of higher quality than imports. Some would represent perishable items that cannot be shipped from distant places. It is also likely that prices would be lower because of reduced cost of handling and less spoilage.

In conclusion, it is the opinion of the author that the governments of the territorial islands and the U.S. Congress should embark on a major effort to expand agricultural production on the islands. It is also the author's opinion that the best way to encourage increased local production would be through a program of technical and financial assistance to producer cooperatives.

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[12] Overall Economic Development Strategy, 1980, pp. 11, 12 and 54. Additional calculations by the author.

FOOTNOTES

[1] Abrahamson, *Cooperative Business Enterprise*, pp. 2-15.

[2] *Economic Study of Puerto Rico, 1979*, p. 105

[3] *Overall Economic Development Strategy*, Commonwealth of the Northern Mariana Islands, 1980, p. 54.

[4] *The Far East and Australasia, 1984-85*, p. 724.

[5] Abrahamson, *Cooperative Business Enterprise*.

[6] *Overall Economic Development Strategy*, 1980, p. 54.

[7] The material for this section was taken from various materials prepared by FEDA including a Business Plan (1981), application for financing submitted to the National Rural Development and Finance Corporation (1982), periodic reports issued by FEDA, and an application for grant support submitted to the Ford Foundation (1985).

[8] The material for this section was taken from USDA Farmer Cooperative Service Report 152, *St. Thomas-St. John Fishermen's Cooperative* (1977), FSC Preliminary Report 11, *Feasibility of Organizing a Fishery Marketing Cooperative* (1975), and material provided by Mr. Edward Towle of the Island Resources Foundation

[9] The material for this section was taken from three unpublished manuscripts prepared by Dr. Mary McCutcheon, an anthropologist with the Smithsonian Institution. Two of the papers, "Fresh Fruits and Vegetables in Kuror, Palau" and "Musing Clubs in Palau" were presented in meetings of the Association of Social Anthropologists in Oceania (March 1985). The third is a portion of a PhD dissertation entitled *Resource Exploitation and the Tenure of Land and Sea in Palau* (1981).

[10] *Overall Economic Development Strategy, 1980*, pp. 17, 21a and 54.

[11] For further information, contact National Cooperative Business Association, 1828 L Street, N.W., Suite 1100, Washington, D.C. 20009.

[12] *Overall Economic Development Strategy, 1980*, pp. 11, 12 and 54. Additional calculations by the author.

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